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FACTORS INFLUENCING PRICE DIFFERENTIALS BETWEEN POTATO MARKETS

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The question of the factors influencing the price differentials between markets derives its chief interest from its bearing upon the problem of explaining and forecasting prices of specific commodities in individual markets. The present study is the outgrowth of such an investigation of the price of potatoes in St. Paul and Minneapolis. But the study of these price differentials for particular commodities and markets involves certain problems which are common to similar studies for all commodities and still more problems common to the study of differentials between various markets for the same commodity. Accordingly it seems worth while to present the results of the present study as a contribution to the general subject of price differentials between markets.

The estimates of farm price published by the United States Department of Agriculture give opportunity for constructing a map showing with a considerable degree of accuracy the general situation as to the geography of potato prices for the entire United States. This map is helpful in bringing to light the more important factors bearing upon the situation, especially the relations between the producing and consuming areas or, as Prof. Fetter has expressed it, between the centrifugal and the centripetal markets.[1]

[1] Fetter, Frank A. *The Economic Law of Market Areas*, in *Quart. Jour. of Econ.*, May, 1924, p. 520.

Fig. 1 attempts to present the typical geography of potato prices during the winter season.[2] It is based chiefly upon the ten-year averages, 1906-15, of farm price December 1, by states, as published by the United States Department of Agriculture. The more familiar cross-hatched, or shaded map[3] has been replaced by what has been called an "isograph." The principle is that of the familiar isothermal, isobaric, and other "iso maps" of the meteorologists, and of the contour maps of the geographers; lines are shown connecting points of equal prices. Once constructed, this map brings out a number of im-

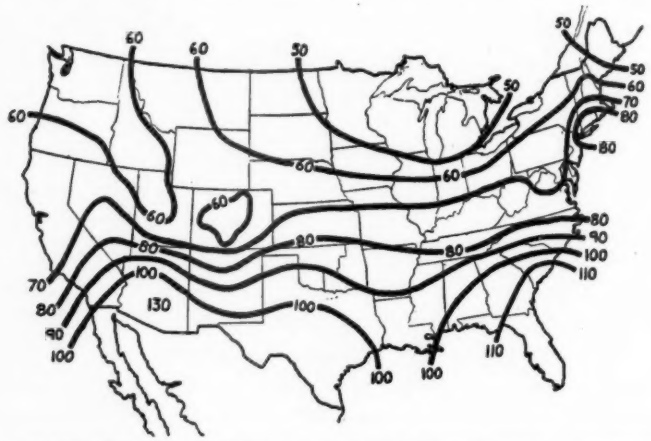

FIG. 1. ISOGRAPH OF TEN-YEAR AVERAGE FARM PRICE OF POTATOES, DECEMBER 1, 1906-1915

Study of the price system indicates that in general Maine and New York State Potatoes find their market largely in New England and in New York State, while potatoes from the north central states must go chiefly southward, meeting on the west the competition from Colorado and Idaho.

portant facts. The highest price outside of the southern states is found in the neighborhood of New York City. Clearly potatoes from Maine must find their market, on the average, entirely in the New England states and in the neighborhood of New York City. It is clear also that New York State potatoes must find their market almost entirely within the state, for the price differentials are not such as to permit their moving

[2] Reproduced from Technical Bulletin 10, Minn. Agr. Exp. Sta., *Factors Determining the Price of Potatoes in St. Paul and Minneapolis*, 1922

[3] *Cf.* U. S. D. A. Bulletins 594, 696, and 755 for such maps showing the geography of farm prices of wheat, corn and oats.

west, nor of their moving south into Pennsylvania to any considerable extent.

Going further west, it appears that the Michigan, Wisconsin, and Minnesota area must supply principally the states to the south of this area, presumably with considerable overlapping of the areas supplied from each of the three states. Further west, conclusions are rendered less reliable owing to the fact that many of the potatoes from western producing areas are of exceptionally high quality. The low prices in the Colorado area and in the area centering about western Idaho are nevertheless quite striking.

Three factors seem to be largely responsible for the overlapping of market areas: differences in the quality of potatoes produced in different sections, difficulty of accurately comparing prices in the absence of close grading, and irregular price fluctuations in different markets. The latter deserves brief explanation. Owing largely to the lack of significant grades, speculative buying and selling of potatoes is difficult and arbitrage dealing (the "spreading" of the grain markets) is practically impossible. Markets are kept in line by the shifting from one market to another of buyers who purchase, not for speculation, but in the regular course of an ordinary merchandising business. Such buyers do not shift quickly and as a result, a low price in Minneapolis, for example, may lead some of the more enterprising buyers in Pennsylvania to purchase in that market while most buyers, even in Ohio, are still getting their supplies at a higher price from Michigan.

The system of price differentials indicated by Fig. 1 is that characteristic of the main crop season. During the summer the geography of prices is very different, the low price areas being in the south with prices increasing along the lines followed by the potatoes in their northward movement. From the beginning of the new season when all of the new crop is coming from Florida, through the summer and into early fall the system of price differentials suffers continual change with the shifting of the principal producing areas. No attempt was made to determine the systems of differentials during these intervening periods, but merely to determine the approximate dates between which the system characteristic of the winter season is maintained.

Figs. 2 and 3 show for six years, beginning with 1919, the monthly price changes in several important markets. It will be noted that during most of each season prices in the various markets show very similar movements, but that at the beginning and at the end of each season the tendencies may differ. In 1920, for example, prices rose slightly from September to October in New York, and remained practically constant in Philadelphia, while the three western markets showed marked price declines. In 1921 there was a similar divergence of price movements between September and October while in the following spring Kansas City joined with Chicago and St. Paul-Minneapolis in rising between April and May, while New York and Philadelphia showed similar declines. These divergencies are the natural result of readjustments in the system of differentials between markets which naturally accompany the shift in areas of supply as the late crop comes on and again as the new crop from the south returns to dominance of the markets.

Another striking variation is observed when the ruling differentials are compared for different years. During 1919-20, for example, prices in St. Paul-Minneapolis ran quite close to prices in New York City, even exceeding them in November and December, but during much of 1922-23 and 1923-24, the prices in St. Paul-Minneapolis were about $1.00 a hundredweight below prices in New York City. Such extreme changes in the ruling differential from one year to the next deserve further study.

In the subsequent investigation certain details of method were dictated by special considerations arising out of the general problem to which the study of market differences was subsidiary. It appeared probable that much of the variation in differentials from year to year arises from variations in the quality of the potatoes in the different markets, and that a comparison of market differentials might furnish a basis for measuring and forecasting the influence of these variations in quality on the average annual prices of Minnesota potatoes.

For this purpose it was desirable to compare the price of Minnesota potatoes with the price of potatoes from a region in which the quality of the crop is subject to as little variation

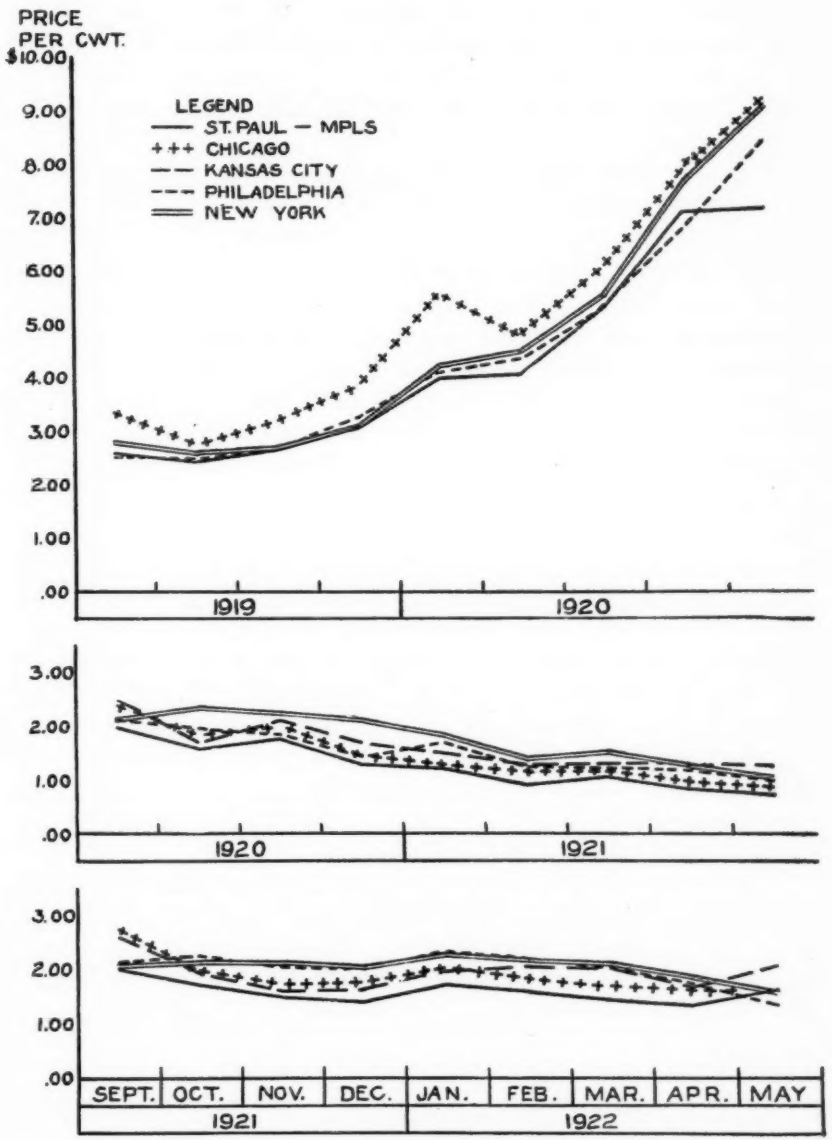

FIG. 2. PRICES OF POTATOES IN IMPORTANT MARKETS MONTHLY, 1919-20 TO 1921-22

The differentials between these widely separated markets remain relatively constant throughout the period from October to April.

as possible and in a market influenced as far as possible by the same factors that influence the price of Minnesota potatoes in St. Paul-Minneapolis. The price of Maine and New York State potatoes in New York City seemed best to meet these requirements.

The New York market, although far removed geographically from St. Paul-Minneapolis, appeared to show the effects of practically the same forces as influence the St. Paul-Minneapolis market. Statistical studies have shown that the principal fluctuations in the price of potatoes in both St. Paul-Minneapolis and in New York City may be accounted for by changes in the general price level and in the total United States production.[6] Furthermore an effort to determine the effect of production in adjacent states upon the price of potatoes in St. Paul-Minneapolis has shown no evidence of any effect from local production except as it forms a part of the total United States production.[7]

The desire to use the price differential as a basis for judging the effect which variations in quality would have upon the price dictated the use of a differential taken at some time early in the season in order that it might be useful for forecasting. As noted above, examination of the data for even a few years shows that the differentials in September give little indication of the differentials which will prevail later in the season. Beginning with October, however, the differentials remain relatively constant until April or May. The differentials for both October and November were taken for study.

Fig. 4 and Table I show the differences between the price of potatoes per hundredweight in New York City and the price in St. Paul-Minneapolis in November 1902-24. The price in New York City applies to "Maine and State and Western" potatoes, the price in St. Paul-Minneapolis to Minnesota potatoes.[8]

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[6] *Cf.* Working, Holbrook. *Factors Determining the Price of Potatoes in St. Paul and Minneapolis*, Minn. Agr. Exp. Sta. Technical Bulletin 10 (1922).
Waugh, F. V. *Factors Influencing the Price of New Jersey Potatoes on the New York Market*, New Jersey State Department of Agriculture, Circular No. 66.
Scoville, G. P. *Relationship Between Production and Price for Some New York Crops*, Cornell University (mimeograph).

[7] Working, *Op. cit.*, pp. 24, 25.

[8] Price data from U. S. D. A. Yearbook, 1923, Minn. Tech. Bul. 10, and market reports of the U. S. D. A.

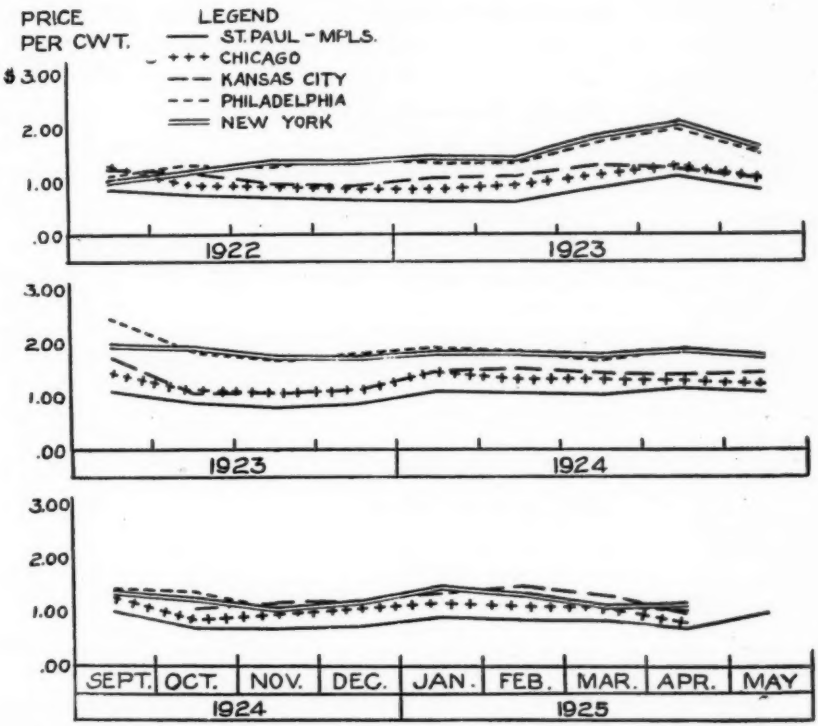

FIG. 3. PRICES OF POTATOES IN IMPORTANT MARKETS MONTHLY, 1922-23 TO 1924-25

Comparison of the differentials between markets in successive years shows marked differences, despite the tendency to remain relatively constant during each season.

The appearance of the chart of the price differentials suggests the need of fitting a secular trend as a basis from which to measure variations; in using the differentials as a measure of variations of quality, poor quality, for example, may be inferred only when the differential is greater than "normal," the normal being determined by a method which allows it to change with changes in other factors which influence the differential.

As is too often forgotten, this question of the need of fitting a secular trend really opens up the whole question of what are the factors influencing the differential. Perhaps the most

important element in the normal differential [9] is the freight rate; but variations due to changes in freight rates can not be represented by a straight line or by any other simple function of time. If the freight were the only element in the dif-

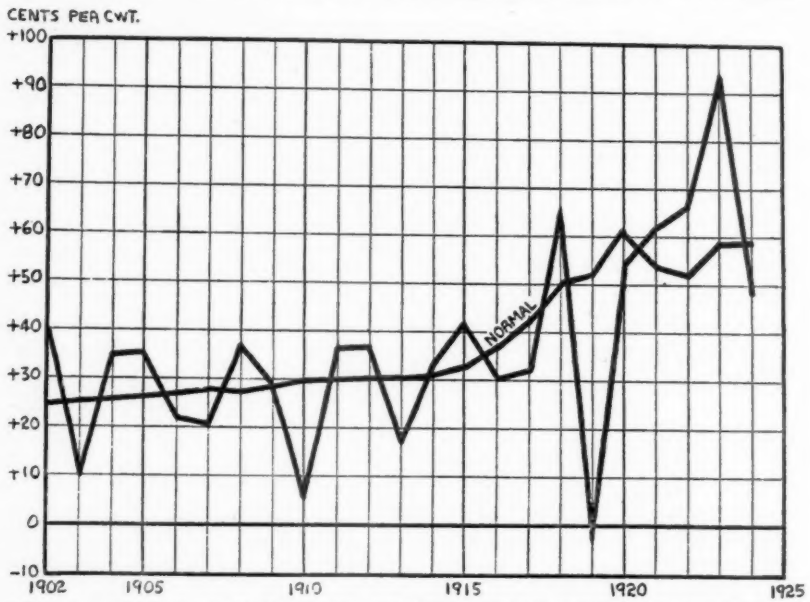

FIG. 4. ACTUAL AND NORMAL DIFFERENTIALS BETWEEN PRICES OF POTATOES IN ST. PAUL-MINNEAPOLIS AND IN NEW YORK CITY IN NOVEMBER, 1902-1924

The "normal" differential takes account of the calculated effects of a trend and of changes in freight rates and in the general level of wholesale prices. The actual differential ranges above and below this normal chiefly on account of variations in the quality of Minnesota potatoes, but partly also because of variations in the proportion of the crop produced in the west, and other factors.

[9] There is abundant precedent for speaking of the ordinates of secular trend as normals. This use of the term is in line with Marshall's definition of *normal* as the adjective corresponding to the noun *law*, in the sense of a natural law. (*Principles of Economics*, Bk. I, Ch. III, Sec. 4.) As Marshall explains further, *normal action* is action which may be expected *under certain conditions*, those conditions to be defined by the writer or speaker, either explicitly or by implication, according to his wishes in the particular instance.

Marshall's definition of the term *normal* places upon the writer the duty of making clear the conditions assumed. As customarily used by the statistician, the conditions assumed are *the operation of those factors which cause a trend* (usually not more specifically defined). The form of trend to which the term has been applied has usually been a straight line or other function of time.

As will become apparent, the writer here applies the term *normal* to the ordinates of a "trend" which is a function not only of time but of other variables. These variables, however, all possess a common characteristic in that their fluctuations are upon different levels during different parts of the period. As a result, their influence must be reflected in any straight line or other function of time fitted to the data, yet reflected imperfectly. No trend can be fitted which does not show influence from them, yet their influence can be adequately measured only by considering them as variables together with time in determining the trend.

ferential the effect of its fluctuations might readily be removed by subtracting the freight rate from the differential. There are, however, at least two other elements in the differential: a dealers' margin, probably quite small,[10] and a difference resulting from difference in average quality. Probably any portion of the differential which arises from difference in quality is affected by changing price level also.

This situation may be stated as follows. The normal differential, which we are now investigating, is composed of two parts: a differential due to freight charges which we may call *Da,* and a differential due to difference in quality (includ-

TABLE I

PRICES OF POTATOES PER HUNDREDWEIGHT IN ST. PAUL, MINNEAPOLIS, AND IN NEW YORK CITY IN NOVEMBER, AND ACTUAL AND "NORMAL" DIFFERENTIALS, 1902-24*

Year	Price		Actual Difference	Normal Difference
	In St. Paul and Minneapolis**	In New York City		
1902	$ .57	$ .97	$ .40	$ .26
1903	.90	.98	.08	.26
1904	.50	.85	.35	.26
1905	.88	1.23	.35	.26
1906	.63	.85	.22	.27
1907	.77	.97	.20	.28
1908	.95	1.32	.37	.28
1909	.65	.93	.28	.28
1910	.80	.85	.05	.29
1911	1.13	1.50	.37	.29
1912	.70	1.07	.37	.30
1913	1.02	1.18	.16	.30
1914	.57	.90	.33	.30
1915	.85	1.27	.42	.32
1916	2.52	2.82	.30	.36
1917	1.97	2.28	.31	.41
1918	1.62	2.28	.66	.49
1919	2.65	2.62	—.03	.51
1920	1.77	2.30	.53	.61
1921	1.47	2.08	.61	.54
1922	.70	1.37	.67	.52
1923	.81	1.77	.96	.59
1924	.68	1.16	.48	.59

*Prices for St. Paul-Minneapolis from Minn. Agr. Exp. Sta. Tech. Bul. No. 29; for New York City, from U. S. D. A. Yearbook, 1923, p. 773, and from U. S. D. A. Market News Service.

**Prices apply to average quality Minnesota potatoes, table stock.

[10] Data compiled by the Joint Commission of Agricultural Inquiry (*Report of the Joint Commission,* 192, Part III, p. 47) on 355 cars of northern potatoes handled in four cities show "miscellaneous handling costs" of 1 per cent and "receiving distributors' gross profits" of 1.3 per cent of the wholesale selling price, while transportation and tax amounted to 20 per cent of the wholesale selling price.

ing also a small item for dealers' margins) which we may call *Db*. Expressed algebraically, with *Dn* representing the normal differential, we have $D_n = D_a + D_b$. Neglecting the influence of changing price level, the differential due to difference in quality may be written as a function of time, to allow for a trend if one exists, probably with sufficient accuracy as a linear function, which gives $D_b = a + bt$, the usual equation for a straight line trend, in which t represents time, and the values of a and b are to be determined from the data. The influence of the changing price level may be included by writing $D_b = L\ (a + bt)$, L representing the index number of the wholesale price level.

Similarly, the portion of the differential which results from the freight rate may be stated as an even simpler function of an index of freight rates: $D_a = cF$, in which c is a factor to be determined and F the index of freight rates.

Putting these equations together, we have,

$$D_n = D_b + D_a = L\ (a + bt) + cF$$
$$\text{or } D_n = aL + btL + cF \text{----------} (1)$$

Using the Bureau of Labor Statistics index number for all commodities as a measure of the general price level, all the data are at hand for the solution for this equation except an index number of freight rates. For present purposes, it is preferable that this index number should be obtained from rates to a section in which Minnesota potatoes come into competition with potatoes which might go to the New York market. Minnesota potatoes frequently go to Cincinnati and to Pittsburgh, but not often much farther. As far as one can judge from reports of shipments these points are near the border line of the usual Minnesota market area, yet well within the field in which fluctuations in the price of Minnesota potatoes makes itself felt directly. At the same time, they are close enough to the New York production area to be quite sensitive to fluctuations in the New York market, if they do not indeed compete directly with New York for the crop from certain areas. An average of the freight rates from St. Paul-Minneapolis to Cincinnati and to Pittsburgh was taken, ac-

cordingly, as an index of the freight rate most clearly significant in influencing the differential between the price of potatoes in St. Paul-Minneapolis and the price in New York City. The data are shown in Table II.

Solving by the method of least squares to determine the values of a, b, and c in the equation for the normal differential gives the following formula for the normal value of the November differential:[11]

$$D_n = 0.0909L + 0.00335tL + 0.8909F$$
(origin for t at 1913)

This is the equation of the line shown in Fig. 4 as the November normal.

The equation indicates that the freight rate which is effective in determining the differential between the price of potatoes in St. Paul-Minneapolis and the price in New York City is 89 per cent of the mean of the rates to Cincinnati and to Pittsburgh ($c = +0.89$). The remainder of the normal differential appears to arise from factors fluctuating rather closely with the general price level, probably chiefly a discount due to inferior quality, amounting in 1913 at a price level of 100 to nine cents ($aL = 9.09$; $bt = 0$) and increasing each year by about one-third of a cent ($bL = 0.335$). At a price level of 200, the values of aL and bL would be twice as great, 1.16 cents and 18.18 cents, respectively.

A similar solution using the October differentials gives the equation:

$$D_n = 0.0716L - 0.00416tL + 0.877F$$
(origin for t at 1913)

The effect of the freight rate appears practically the same as on the November differential, the effective rate being represented as 88 per cent of the mean of the rates to Cincinnati and to Pittsburgh, while for November it is 89 per cent. The remaining portion of the normal differential amounts to seven cents for 1913 ($aL = 7.16$; $btL = 0$) and appears to decrease two-fifths of a cent a year at a price level of 100 ($bL =$

[11] Owing to the small number of years in which L and F showed any large variations, some difficulty was encountered in obtaining a satisfactory solution. The problem is discussed in detail in the appendix.

TABLE II

FREIGHT RATES ON POTATOES FROM ST. PAUL-MINNEAPOLIS TO CINCINNATI AND TO PITTSBURGH, ON NOVEMBER 1, 1902-1924*

Year	To Cincinnati	To Pittsburgh	Mean
	(cents)	(cents)	(cents)
1902	22.0	25.0	23.5
1903	22.0	25.0	23.5
1904	22.0	25.0	23.5
1905	22.0	25.0	23.5
1906	22.0	25.0	23.5
1907	22.0	25.0	23.5
1908	22.0	25.0	23.5
1909	22.0	25.0	23.5
1910	22.0	25.0	23.5
1911	22.0	25.0	23.5
1912	22.0	25.0	23.5
1913	22.0	25.0	23.5
1914	22.0	25.9	23.9
1915	23.1	26.3	24.7
1916	23.1	26.3	24.7
1917	23.1	26.3	24.7
1918	29.0	33.0	31.0
1919	29.0	33.0	31.0
1920	38.5	44.0	41.5
1921	38.5	44.0	41.5
1922	34.5	39.5	37.0
1923	41.5	47.5	44.5

—0.416). This is the reverse of the trend found for the November differential but appears reasonable from an inspection of the data and is perhaps to be explained on the ground of improved storage facilities and a consequent moderation in the need for seeking sales in distant markets to dispose of large shipments at digging time.

The deviations of the actual differentials from this line of normal differentials both for October and for November showed a clear correlation with the errors of estimate observed in the original study of the price of potatoes in St. Paul-Minneapolis; in years in which the price differential between New York and St. Paul-Minneapolis was great, the actual price in St. Paul-Minneapolis tended to be lower then the price estimate, based on the factors previously considered, and in years in which the price differential between New York and St. Paul-Minneapolis was small the actual price in the latter market tended to be higher than the price estimate. This observation agreed with the hypothesis that the price differ-

*Freight rates compiled for the author by the Chicago, St. Paul, Minneapolis, and Omaha Railroad Company, rates per hundredweight on car lots without refrigeration.

ential should give a measure of quality; if the large differentials indicated unusually poor quality of Minnesota potatoes it was eminently reasonable that the average price in St. Paul-Minneapolis during those years should be lower than was expected when the variations in quality were left out of consideration.

This relation between the errors of estimate and the variations in the market differentials was found to be considerably closer for the November differentials than for the October differentials, the difference appearing so clearly in the scatter diagrams that it was unnecessary to calculate the Personian coefficients of correlation, their absolute values being of no importance.

While the deviations of the November market differentials from their normals, as calculated by the method just described, appeared to reflect clearly variations in the quality of Minnesota potatoes, the measure required further refinement. Minnesota potatoes being, on the average, of a quality slightly inferior to Maine and New York potatoes, it appeared probable that their price would suffer more in years of large crops and that the differential between the two markets would increase in years of large crops and decrease in years of small crops. Correlation of the differential (measured from its normal and corrected for price level) with the ratios of total production in 27 late crop states to its normal[12] yielded a coefficient of correlation of $+0.27$ with the regression equation,

$$d = L\,(-0.2724 + .002769C)$$

L representing the price level, as before, and C the total late crop of potatoes expressed as a percentage of normal. It appeared, therefore, that on the average with a price level of 100 per cent of 1913, an increase of production in the late crop states of ten per cent, relative to normal, tends to cause an increase of 2.8 cents in the differential.

Another factor which would ordinarily be expected to influence the differential between two markets so widely separ-

[12] In work done subsequent to the publication of Minn. Tech. Bul. 10 it has been found preferable to use production in 27 late crop states rather than either yield or production for the entire United States; *Cf.* Tech. Bul. No. 29.

ated as New York and St. Paul-Minneapolis, the one being a centrifugal market, is the variation in the percentage of the crop produced in the area belonging to the centrifugal market. Previous results [13] had shown no relation between the proportion of the entire crop produced in Minnesota and Wisconsin and the price in St. Paul-Minneapolis, but the experiment was made of taking a larger tributary area, including the seven states of Minnesota, Wisconsin, Illinois, Iowa, Nebraska, and North and South Dakota, calculating the percentage of the total late crop produced in these states, and taking deviations (absolute) of this percentage from its secular trend, this to be used as the measure of "western production."

The study of the effect of local production, as thus measured, seemed to require a multiple correlation, inasmuch as the local production might be expected to affect not only the differential between the two markets, but also the error of estimate for the price in the St. Paul-Minneapolis market. Furthermore it appeared desirable to consider the fact that the effect of any given change in the percentage of the crop produced locally would presumably depend upon the level of freight rates. This led to the following algebraic statement of the relationship: $P\text{-}P' = a + b\ (C_wF) + cD$------(2) where

P-P′=the actual price in St. Paul-Minneapolis minus the estimated price.

C_w=the western production, measured as described above.

F=an index number of freight rates (the mean of the rates from St. Paul-Minneapolis to Cincinnati and Pittsburgh).

D=the November price differential after correction for its changing normal and for its variation due to size of the total crop of late potatoes.

a)
b)=constants to be determined by the methods of least
c) squares ([14].

Stated otherwise, this equation means that it is assumed that the deviations of the actual price from the estimated

[13] *Cf. supra*, p. 382.

[14] The reader will recall that the method of least squares gives the same constants for the regression equation as are obtained by multiple correlation. *Cf.* Tolley and Ezekiel, *A Method of Handling Multiple Correlation Problems*, in *Jour. Am. Stat. Assn.*, Dec., 1923.

price may be accounted for in considerable part by the variations in quality as measured by the corrected price differentials (D) and by the variations in western production (Cw) taken in conjunction with freight rates (F). Solution by the method of least squares will give the measure of the influence of each of these factors upon $P\text{-}P'$, due account being taken of their influence upon each other.

In obtaining the solution of equation (2) by the method of least squares, attention must be given to the fact that if the values are used as they stand the large values of all the variables occurring in recent years, as a result of the rise in the general price level, will cause the relationship existing in those years to exercise a dominating influence upon the results. It is necessary to apply a method of weighting which will give the relationship observed in each year its proper influence in the result. This is most readily accomplished by making the actual solution for the equation

$$\frac{P\text{-}P'}{L} = a' + b\left(C_w\frac{F}{L}\right) + c\frac{D}{L} \qquad (3)$$

L representing the wholesale price index number, as before. The values thus obtained for b and c may be entered directly in equation (2), while the a of the latter equation is equal to $a'L$.

Carrying out the necessary computations, we obtain the equation:

$$P\text{-}P' = -0.00645L + 7.47C_wF - 0.98D$$

At the same time we may easily obtain certain coefficients of correlation which should be noted. Letting

$$\frac{P\text{-}P'}{L} = X_1$$

$$\frac{C_wF}{L} = X_2$$

$$\frac{D}{L} = X_3$$

we have, in the customary notation,

$$r_{12} = +0.08$$
$$r_{13} = -0.55$$
$$r_{23} = +0.51$$
$$R_{1.23} = 0.69$$

This is indeed a surprising result, for it indicates that whereas the percentage of the total crop produced in the sever western states adjacent to St. Paul-Minneapolis (as measured by X_2) is rather closely related to the difference between the price in New York and the price in St. Paul-Minneapolis as represented by X_3), the coefficient of correlation being —0.55, it proves of no significant value in explaining the changes in the price in St. Paul-Minneapolis, ($r_{12} = +0.08$).

If the distribution of the crop, as measured by the percentage produced in the seven western states is related to the differential between the price in St. Paul-Minneapolis and the price in New York City, but does not appreciably influence the price in St. Paul-Minneapolis, its influence on the differential must arise from an effect on the price in New York City. It seemed probable, therefore, that the significant characteristics of the distribution might better be measured by taking the percentage of the crop produced in those states which supply the New York district, namely the six New England states and New York state. The facts, however, did not bear out this hypothesis. Calculating a new variable, X_4, from the percentage of the eastern production to the total late crop as X_2 was calculated from the percentage of western production to the total late crop, the correlations obtained, even after careful correction of the earlier production estimates in the light of subsequent census data, were much lower than before:

$$r_{14} = -0.01$$
$$r_{13} = -0.55$$
$$r_{43} = -0.24$$
$$R_{1.43} = 0.57$$

The multiple correlation of the differential, corrected as previously described, with both the western production and the eastern production, expressed as deviations from secular trend of the percentages of the total late crop, together with the simple correlations, were:

$$R_{2.34} = 0.58$$
$$r_{23} = +0.51$$
$$r_{34} = -0.24$$
$$r_{24} = -0.77$$

In other words it appears that the distribution of the crop does not materially influence the price in St. Paul-Minneapolis, but does have a considerable effect upon the price in New York City, and further that the percentage of the crop produced in the seven western states appears to furnish a better measure of the distribution as it influences the price in New York City than does the percentage of the crop produced in the states directly supplying the New York market.

The explanation of this peculiar situation is probably to be found, partly at least, in the way in which producers in the different sections react to low prices. Prices on the farm are always considerably lower throughout most of the western states considered than in any of the eastern states. In the western states the average farmer probably can find better use on the farm for potatoes which are not sold and also being usually less dependent upon the potato crop for his cash income, is under less pressure to sell his crop when prices are low. These three factors combine to make the elasticity of what may be called the farmer's demand for his own potatoes (or the elasticity of supply) considerably greater in the western states than in the eastern states. In consequence, when there is a large crop and a large percentage of the crop is raised in the western states, more potatoes are left on the farms than with an equal crop, a small percentage of which is raised in the western states, and the average price over the entire United States is higher as a result of the distribution of the crop. Prices in St. Paul-Minneapolis, however, are further below the average for the United States than would be the case with a more equal distribution of the crop. Apparently these two factors practically offset each other so that the net effect of the unusual distribution on the price in St. Paul-Minneapolis is nil.

This explanation would account for the lack of any apparent effect on the price in St. Paul-Minneapolis from relatively large production in the west only when the entire late crop is large, but if the influence is sufficiently strong in the years of large total crop, it might conceal an opposite tendency in

years with the same distribution, but short total crop. Separate study of the relation of distribution of the crop to price in years of large total crop and in years of small total crop failed however to reveal any difference between the two groups of years.

Another explanation may be suggested which would be valid for all sizes of total crop. It may be that whatever the price, a smaller percentage of the western crop is actually available to influence the market than of the eastern crop. Such a condition would be produced either by a larger percentage of small and otherwise unmarketable potatoes or by less careful handling and greater waste in the west.

Making allowance for the effect of the distribution of the crop on the average price for the entire United States, the distribution may then be considered as affecting both the price in St. Paul-Minneapolis and the price in New York City and through this double effect determining the differential between St. Paul-Minneapolis and New York City. The fact that the percentage of the crop produced in the group of western states considered has a greater influence on the differential than the percentage produced in the group of eastern states, viewed in this light, does not appear unreasonable. It does suggest, however, that even if an independent measure of the variations in quality of the potatoes on the two markets could be obtained, the variations in the differential would not be entirely explained until some additional factors were considered.

Further study of the differential seems to require a detailed examination of the freight rate structure and of the consuming areas supplied by the different producing centers with various distributions of the crop. Existing data on carlot shipments of potatoes to the various states, together with the freight rates prevailing, seem to offer a basis for determining the proper differentials, on the assumption of uniform quality of all potatoes, and would form a valuable basis for determining the areas which should be supplied from the different producing sections under various conditions of distribution of the crop. With this data available, it would be easy to determine when any particular producing area was temporarily obtaining either too wide or too narrow a distribution of its crop and,

by obvious inference, when its prices were unduly low or unduly high, relative to prices in other producing sections. Such data would have been highly valuable during the past season (1924-25). During the early part of the season prices in Minnesota were relatively low and made possible a wide distribution of the crop, with the result that supplies were exhausted more rapidly than in eastern districts, necessitating a subsequent rise in the Minnesota price, relative to other sections, and a narrowing of the field of distribution.

APPENDIX: CALCULATION OF THE NORMAL DIFFERENTIAL BETWEEN POTATO PRICES IN ST. PAUL-MINNEAPOLIS AND NEW YORK CITY

Constants for the equation for the normal differential between the price of potatoes in St. Paul-Minneapolis and in New York City,

$$D_n = aL + btL + cF$$

were first calculated by the method of least squares from values of the October differential for each year, 1902-23, yielding the result,

$$D_n = 1.59L - 0.0778tL - 0.585F \text{----------} (A)$$

the origin for t being 1900 (the origin used in all the equations given below).

This was obviously highly unreasonable because of the indication that the normal differential varied inversely with the freight rate. It seemed possible that better results might be obtained by including a constant term, independent of the price level, omitted in the first instance because there appeared to be no theoretical justification for such a term. Introducing the constant term gave the equation,

$$D_n = 0.677 - 0.0062L - 0.0401tL + 3.95F \text{------} (B)$$

The differential here appears to vary directly with the freight rate, but the coefficient is much too large, indicating that an increase of ten cents in the average of the rates to Cincinnati and to Pittsburgh would cause an increase of nearly 40 cents in the differential.

Study of the data shows that important variations in two of the independent variables, price level and freight rates, have occurred only in a few years. These few years, therefore, exercise the dominating influence on the result, which, being largely determined by a very small number of observations is subject to a very large probable error. Accordingly, the result may, and apparently does, show the relation between changes in the independent variables and certain changes in the dependent variable which, for the purpose of this problem, are purely chance variations. If these chance variations can be partly

or wholly eliminated a more reliable solution may be obtained. Chance variations will tend to cancel out in averages of groups of years and it happens that with the data in hand the group averages may be taken in such a way that the variation in the averages of the independent variables for successive groups of years, and consequently such variations in the averages of the dependent variable as arise from them, is only slightly less than the variation in the original data. Calculation of the constants for the equation from these group averages, instead of the detailed data, may be expected to give results subject to a much smaller probable error.

Four different groupings were tried, yielding the following results:

$$D_n = 19.71 - 0.479L + 0.0096tL + 1.98F \quad \text{(C)}$$
$$D_n = -10.78 + 0.211L - 0.0075tL + 1.10F \quad \text{(D)}$$
$$D_n = -100.5 + 1.318L - 0.0394tL + 1.43F \quad \text{(E)}$$
$$D_n = -269.2 + 4.70L - 0.119tL + 2.46F \quad \text{(F)}$$

The groupings were as follows:

Equation (C)

1. 1902-04
2. 1905-07
3. 1908-11
4. 1912-15
5. 1916-19
6. 1920-23

Equation (D)

1. 1902-04
2. 1905-07
3. 1908-11
4. 1912-15
5. 1916-18
6. 1919-23

Equation (E)

1. 1902-07
2. 1908-13
3. 1914-18
4. 1919-23

Equation (F)

1. 1902-06
2. 1907-11
3. 1912-17
4. 1918-23

All these results are better than those previously obtained, but only equation (D) gives a value for the coefficient of *F* really consistent with known facts. One reason for the varying results is apparent from a study of Fig. 5 in which the actual values of the average differential for successive groups of years and the values calculated from equations (C) and (D) are plotted for comparison. There is a sharp increase in the average differential between the two last groups used in the computation of constants for equation (C), an increase for which the equation offers complete explanation. However, if the figures from which the averages are obtained be studied in detail it is found that

the last average is high partly because of the inclusion of 1923, a year in which the differential was extremely large on account of a generally recognized low quality of Minnesota potatoes in that year. Similarly the preceding average is low partly because of the inclusion of 1919, a year in which extraordinary conditions resulted in a price in St. Paul-Minneapolis actually higher than that in New York City. The large change between these two averages is therefore partly the result of factors other than those affecting the normal differential, yet the

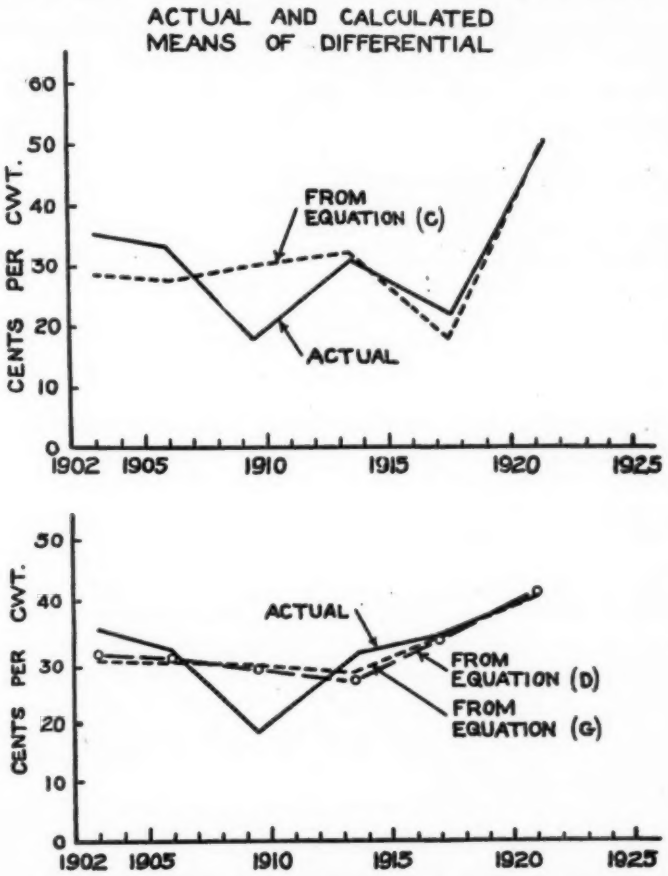

FIG 5. MEANS OF ACTUAL DIFFERENTIAL BY GROUPS OF YEARS AND CALCULATED DIFFERENTIALS BASED ON THREE MOST REASONABLE SOLUTIONS

The sharp rise between the last two means with the upper grouping is due in considerable measure to factors other than a change in the normal, yet the least squares solution attributes the change to the factors determining the normal, introducing a spurious element in the solution. The lower grouping reduces the possibility of such a spurious element in the result.

solution shows the change as resulting entirely from the factors included in the normal. Shifting of the year 1919 from the earlier to the later group results in a more complete cancellation of the "chance" variations which it is desired to eliminate and explains the better results obtained with the latter grouping.

Thus far attention has been confined to the values obtained for the coefficient of F in the different solutions. The other constants show much greater discrepancies between the different solutions, owing to the fact that relatively large changes in one may be almost completely offset by appropriate changes in the other two. The relations between the independent variables are such that widely different sets of coefficients may yield very similar values for D_n, and accordingly small fluctuations of sampling in the dependent variable may produce wide variations in the coefficients obtained. Such a situation argues in favor of holding the number of constants to be determined to a minimum in order to reduce the probable error of the results. There is little ground for believing that there exists any element in the price differential which is truly a constant, unaffected either by changes in the price level or in freight rates and accordingly the constant term was eliminated and another solution obtained using the same grouping of the data as that upon which equation (D) was based. This gave

$$D_n = 0.126L - 0.00416tL + 0.877F \text{----------} (G)$$

the equation discussed in the text above.* The calculated values are shown in Fig. 5.

This same grouping of the data was used in the calculation of the constants for the equation for the normal differential in November.

The diversity of the results obtained in the different solutions is evidence of the existence of sources of error which may have left their effects even in the final result. Any authority which this result may carry must arise from its agreement with known facts and from the degree of success which attend its application. The chief merit which the statistically determined formula may claim in this instance is that the terms are at least mutually consistent and there is no possibility of the gross errors which might result from the arbitrary assumption of values for the formula.

The case has been set forth in detail as an interesting illustration of the possibility of encountering data of such a nature that a least-square solution is subject to a much higher probable error than would ordinarily be anticipated. In the solution for equation (A), for example, there were only three constants to be determined from 22 independent observations, yet the results obtained were preposterous.

*The equation being stated here for an origin of t at 1900 naturally has the first term different from that of the earlier statement in the text given for an origin of t at 1913. Charts of the two equations, of course, would be identical.

A STATISTICAL TEST OF MEASURES OF FARMERS' FINANCIAL SUCCESS

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Objectives in Measuring Farm Incomes.—Studies of the incomes that farmers receive have generally been made with either or both of two primary objectives: (1) to measure the net incomes received, for the purpose of comparing farmers' earnings with the earnings of other classes; or (2) to measure the earnings of individual farmers as an index of their comparative effectiveness as farmers, for the purpose of making comparisons of farm organization and operation from farm to farm.

It is very difficult to make any satisfactory comparison between the real incomes received by farmers and by urban workers. A considerable part of the expenditure of the city dweller goes for things that the farmer does not have to pay for. How can the pecuniary value of the use of a farm house lacking modern conveniences be estimated for satisfactory comparison with the rent paid for a steam-heated, electric-lighted apartment, with hot and cold running water and tile baths? And on the other hand, how can the cost of meals snatched in an over-crowded and stuffy cafeteria be compared with the value of fruits and vegetables in their prime, of a freshness that the city man seldom enjoys? No really adequate attack has been made on the problem of comparing the real incomes of farmer and city man; the figures frequently used are based on so many hasty assumptions that their validity for this purpose is doubtful. The whole problem is one that needs a fresh attack. But it is doubtful if a really satisfactory comparison can ever be made; the imponderables are too significant for any valuation to be generally acceptable.

For comparison from farm to farm, however, the difficulties are not so great. If it be recognized in the beginning that the objective is solely to compare the effectiveness of one farmer with another, or of one system of farming with another system, there are more elements in common, and by making enough estimates of the value of those things for

which no price has been paid or received, fairly satisfactory results can be obtained.

The labor income method.—The concept that has been most widely used for comparing the net income of one farmer with another is that of "labor income." This measure is intended to show the income that the farmer has for his year's labor and management after deducting expenses (except interest paid), depreciation, the estimated value of unpaid labor performed by other members of his family, and an estimate of the income his capital would have yielded had it been invested in farm mortgages rather than in his own farm. No credit is made for the value of farm products used by the family or for the use of the dwelling.

The purpose in using net incomes as an index of a farmer's effectiveness would seem to be to let his net earnings under the competitive conditions of agriculture show his real success. Since many assumptions must be made in arriving at the final net earnings figure, each decision must be consistent with the final objective if a satisfactory result is to be secured. The reason that labor income has not been an entirely adequate index is that some of the assumptions upon which it is based have not been consistent with the objective.

Other methods suggested.—For some years there has been a growing feeling that the labor income figure was not entirely adequate as a measure of farmers' effectiveness, and a good deal of discussion of and experimentation with other methods of measuring net returns from farming. Without making any attempt to trace the whole course of the development, several typical proposals may be mentioned.

In 1917 Goodrich suggested using net cash rents as a basis for making a separate charge for the use of land, and including house rent and farm products and firewood used by the farm family in the farm receipts. The figure thus obtained he designated "the farmer's earnings."[1] The following year two bulletins of the Department of Agriculture and an extension circular of the University of Kentucky used the new

[1] Goodrich, C. L., *Memorandum relative to labor income as a measure of efficiency of farm organization, practice, and management;* Memoranda No. 1044 and 1175, Cooperative Extension Work in Agriculture and Home Economics. March and November, 1917.

measure, either alone or in conjunction with labor income.[2] Haskell used an "index of earnings," the "farmers earnings" adjusted for size of farm, together with per cent return on investment as the principal measures of success.

In a bulletin published the same year, Hunter and Jayne abandoned labor income entirely, using per cent return on capital as the sole measure of efficiency. Since the value of "what the farm furnishes the family" approximately equals the value of the farmers labor, these two items were considered to balance each other out, and per cent return computed directly from farm income.[3]

At the meeting of the American Association for Agricultural Legislation, in 1919, Black discussed the division of income between landlord and tenant, and suggested the inclusion of the value of living from the farm and the use of a lower rate of interest on investment, to obtain a more satisfactory "operator's labor income" than had been computed by standard methods.[4]

In a bulletin published in 1920, Dadisman and Sarle made use of "family income," labor income plus use of house and family living from the farm plus family labor, as of equal significance with labor income.[5]

At the meeting of the Farm Economics Association in 1920, Hunter pointed out that the omission of family use of shelter and food furnished by the farm distorted measures of efficiency whether stated as a total or as per cent on investment, to the disadvantage of the smaller farms. He suggested that a new measure, designated by some such term as "labor earnings," be computed including the value of farm products furnished the family and the use of the family dwelling, or that the scope of labor income be enlarged to include these items.[6]

[2] Haskell, E. S., *A Farm Management Survey in Brooks County, Georgia*, U. S. Department of Agriculture Bulletin No. 648, 1918.
Smith, A. G., *A Farm Management Study in Anderson County, South Carolina*, U. S. Department of Agriculture Bulletin No. 651, 1918.
Hutson, J. B., *Livestock and Other Factors for Profitable Farming in Northern Kentucky*, Kentucky Agricultural Experiment Station Circular No. 21, 1918.

[3] Hunter, Byron, and Jayne, S. O., *Profitable Management of General Farms in the Willamette Valley, Oregon*. U. S. Department of Agriculture Bulletin No. 705, 1918.

[4] Black, John D., *The Division of Farm Income Between Landlord and Tenant*, Bulletin 6, American Association for Agricultural Legislation, April, 1920.

[5] Dadisman, A. J., and Sarle, C. F., West Virginia Agricultural Experiment Station Bulletin No. 173, 1917.

[6] Hunter, Byron, *Tests of Farm Efficiency*, unpublished paper delivered at the 1920 meetings of the American Farm Economic Association.

In a bulletin published in 1920, Gray and Lloyd used "Operator's labor income," obtained by charging only the actual rent paid for such land as was rented, and 5 per cent on land owned, to show the larger returns to tenants than the owners. "Per cent net return" on owned capital was used for the same purpose.[7]

At the conference of research workers held in May, 1923,[8] the committee on "Use of the Survey Method in Studying Farm Organization Problems" made the following recommendations:

"That attention be given to the development of a better index of success with which to correlate the causal factors. To this end attention is directed to the following considerations:

"a. A more nearly accurate basis of determining the land charge to be used. This involves not only the development of a satisfactory method of land valuation, but a more adequate determination of the rate to be used.

"b. A better basis for valuing the labor of the proprietor and his family.

"c. More care in including all the items of income. This involves greater care in the taking of inventories of feed and supplies, the inclusion of non-cash items, etc.

"d. In order to develop a dependable index we believe it to be necessary that all variations attributable to marketing practices, abnormal yields, abnormal losses, etc., should be determined, so far as possible, and eliminated.

"Note. The committee realizes that the above stated considerations are all subjects of further experiment in the effort to perfect a technique of investigations."

More recently, Iowa and Kansas have adopted improved measures of farm returns in their regular survey work. In 1923, Holmes was using a cash rent basis for determining land charges, while C. C. Taylor adopted the term "labor earnings" to designate returns computed on this basis.[9]

[7] Gray, L. C., and Lloyd, O. G., *Farm Land Values in Iowa.* United States Department of Agriculture Bulletin No. 874, pp. 25-32, 1920.

[8] Conference of Research Workers in the Field of Farm Organization and Cost of Production. Mimeographed Report, U. S. Department of Agriculture, Bureau of Agricultural Economics, July, 1923.

[9] Holmes, C. L., *Relation of Types of Tenancy to Types of Farming in Iowa.* Iowa Agricultural Experiment Station Bulletin No. 214, 1923.

Taylor, C. C., *A Statistical Analysis of Farm Management Data.* Journal of Farm Economics, Vol. V, No. 3, 1923.

After an extensive study of the subject, Grimes concluded that the net success of the farm would be best expressed as a residual to the operator for his labor and management, and that this would be most accurately obtained by charging land at its net rented value and including family use of farm products in the receipts. He handled the rent problem by omitting farm dwellings entirely from the value of the real estate, the same method followed by Taylor in his article. Grimes suggests the term "operator's income" to designate an index computed by these methods.[10] Gray, in his recent book, suggests that the return to the operator "be arrived at by deducting the actual rate paid for the use of land and 5 per cent or some other assumed rate on the remainder of the farm capital." The figure thus secured he would designate "operator's labor income."[11]

Case and Mosher have given the preference to per cent return as a measure of farmers' effectiveness, recognizing that with very valuable Illinois farms differences in size may markedly affect other measures. They have also adopted the term "labor and management wage" as a more accurate designation for the standard labor income figure.[12]

An Empirical Test of the Different Methods.—Fortunately, definite conclusions as to the merits of these different methods can be obtained by an empirical test of the adequacy with which the different indexes measure the relative success of farms and farmers. By using multiple correlation we can determine just how closely differences in each index from farm to farm can be accounted for on the basis of differences in size, crops, yields, input-output efficiency, and other factors. Using the same group of independent or "causal" factors and different measures of income in turn as the dependent factor, one can determine mathematically which measure of income most accurately reflects differences in earnings, in so far as the earnings are related to the independent variables used.

[10] Grimes, Waldo E., *The Problem of Interest and Rent in Cost Determination*, Journal Farm Economics, Vol. V, No. 2, p. 85, 1923.
———————, *Measures of Income from Farming*, doctoral thesis as yet unpublished, filed in the library of the University of Wisconsin, 1923.
[11] Gray, Lewis C., *Introduction to Agricultural Economics*, page 49, 1924
[12] Case, H. C. M. and Mosher, M. L., *Increasing Farm Earnings by the Use of Simple Farm Accounts*. University of Illinois Agricultural Experiment Station, Bulletin 252, 1924.

An experiment of this sort was made using 270 survey records from dairy farms in Chester County, Pennsylvania, for the farm year April 1, 1922, to April 1, 1923. The labor income and the per cent return on capital were computed by the standard methods,[13] and also a new measure was computed by methods similar to those suggested by Dr. Grimes, which, however, was designated "operator's earnings" for reasons which will be stated later.

The following six factors were selected as those which would probably have the greatest effect upon farm profits in this area:[14]

a—Number of dairy cows.
b—Number of acres of crops.
c—Number of acres in pasture.
d—Crop index.
e—Index of dairy efficiency.
f—Index of labor efficiency.

The three dependent factors were:

x—Labor income.
y—Per cent return upon investment.
z—Operator's earnings.

Correlating each of these in turn with the six other factors the following results were secured:

Rx. abcdef=0.693±.021.
Ry. abcdef=0.771±.017.
Rz. abcdef=0.797±.015.

Apparently the six factors used are more closely related to changes in "operator's earnings" and in per cent return to capital than to change in labor income. A more exact measure of the closeness of the relations may be obtained by stating the results as follows:[15]

[13] Spillman, W. J., Dixon, H. M., Billings, G. A., *Farm Management Practice of Chester County, Pa.*, U. S. Department of Agriculture Bulletin No. 341, p. 25, 1916.

[14] The methods of computing the different indexes are given in a U. S. D. A. bulletin, "Factors Which Determine Farmers' Earnings in Southeastern Pennsylvania Dairy Farming," now in preparation.

[15] The values in this statement are equal to R^2 and to $(1-R^2)$, and are derived from the equation $\sigma_e^2 = \sigma_x^2 (1-R^2)$, which expresses the relation between a coefficient of multiple correlation and the accuracy with which estimates of the dependent variables can be made upon the basis of the net regression equation.

Income stated as—	Proportion of the variability of income accounted for by the six factors	Proportion of the variability of income not accounted for by the six factors
Labor income	48.0 per cent	52.0 per cent
Per cent return on capital	59.4	40.6
Operators' earnings	63.5	36.5

This shows the relative accuracy of three measures of income, as far as they measure the effect of the six causal factors. These results show that the six factors included account for less than half of the variations in labor income, and other factors are responsible for more than half, whereas the six factors account for nearly two-thirds of the variation in operators earnings. In so far, then, as these six factors did really represent causes of variation in the economic efficiency of farmers in this area, the "operators' earnings" figure was one-third more accurate as a measure of farmers' effectiveness than was the labor income figure.

Similar results have been secured in testing the applicability of the new measure in studies of other areas. Thus in a cooperative study with J. J. Vernon, farm incomes on tobacco farms in south central Virginia, were analyzed. The records used included 148 from Appomattox County, and 138 from Pittsylvania County. Four independent factors were used; acres in tobacco, total plow acres, returns per acre of tobacco, and returns per acre of other crops. These four factors gave multiple correlations with several different measures of success as shown in the following statement:

Multiple correlation of 4 causal factors with:

Index	Appomattox records	Pittsylvania records
Labor income	R = .671	R = .593
Labor income plus rent and farm products furnished the family	R = .729	R = .624
Operator's earnings	R = .776	R = .736

These records, obtained from an area where land values are relatively low and farms are small, showed operator's earnings to be as superior to labor income here as it was for the Chester County records.

In a study of 190 records from Twin Falls, Idaho, for 1919, Hunter correlated 8 variables with labor income and with per cent return to capital, and obtained coefficients of R=.571 with labor income, and R=.640 with per cent return to capital. As this was a year when the average per cent return to capital was almost identical with the rate charged in computing labor income, this gives a good measure of the relative accuracy of these two indexes even when the correct rate is used for the land charge.

Differences Between Operator's Earnings and Labor Income.—The differences between the way in which the labor income figure is computed and the way the operator's earnings figure is computed are shown in Table I. These averages are for the same farms as were included in the first correlation test cited.

TABLE I.—COMPARISON OF HANDLING OF DIFFERENT ITEMS UNDER THE "LABOR INCOME" AND "OPERATOR'S EARNINGS" BASIS
(270 dairy farms, Chester County, Pa., 1922-23)

	Labor income basis		Operator's earnings basis	
Items	Items	Totals	Items	Totals
Total farm capital		$16,269		
Working capital		3,619		$3,619
Real estate		12,650		
Real estate used in agricultural production [1]				9,422
Products sold	$3,437		$3,437	
Farm products used by farm family			274	
Gains in inventory	150			
Gains in inventory less adjustment for horse depreciation			132	
Income from outside sources	30			
Total value product		$3,617		$3,843
Cash expenses, other than on real estate or interest	1,947		1,947	
Cash value of family labor	262		262	
Value of farm products used by family labor			26	
Taxes, insurance, building repairs, and depreciation	546			
Interest on capital at 5 per cent	813			
Interest on working capital at 6 per cent			217	
Interest on productive real estate, at 4 per cent			377	
Total charges		3,568		2,829
Labor income		49		
Operator's earnings				1,014
Cash value of operator's labor			645	
Value of perquisites			377	
Total				1,022
Management earnings (surplus for management)				−8

[1] Obtained by eliminating contribution of dwellings to farm value on a multiple correlation basis.

The two principal points of difference are in obtaining the value of the product, and in estimating the deduction to be made for the use of capital.

On the operator's earnings basis, the value of farm products used by the farm family are included in the value of the product, as well as returns from products sold and changes in inventory. An allowance for the value of the use of the house is not included, however. The reason for this omission will be apparent from the further discussion.

Expenses on land, such as taxes, insurance, building repairs, and the estimated loss from depreciation—all such items as are not paid by the tenant when land is rented on a cash-rent basis—are not included in the expenses deducted in computing operator's earnings. Instead, the charge for the use of land is computed at the same per cent on the real estate value as is usually paid by cash tenants in the area. In this case, the average gross cash rent is but 4 per cent on the real estate value. In some other areas it would be very much higher, in others, lower.[16]

The charge for the use of land is obtained by applying this per cent to the value of real estate used in farm production; i. e., the value of the farm less the value of the dwelling. By this process, the farm dwelling is left out of the computation entirely, both with regard to including the expenses or rent incurred because of it, or with regard to including the estimated rent with "farm products used by family."

Capital represented in equipment, livestock, and cash on hand is charged for at the prevailing rate for bank loans, 6 per cent in this region.

One minor difference in expenses is due to subtracting out the value of farm products used by family labor, a necessary offset when the family use of products is included in the product.

Since operator's earnings are designed to make comparisons between farms rather than between men, income to the operator for outside work was not included. This made a difference of $30, on the average. For individual farms, however,

[16] Chambers, C. R., *Relation of Land Income to Land Value*, U. S. D. A. Bul. 1224, 1924. pp. 26-28.

the differences in labor income due to this item are quite marked, as shown in the statement following.

Receipts from outside labor by the operator	Number of farms
None	193
$1 to $50	36
50 to 100	18
100 to 150	9
150 to 200	4
200 to 250	2
250 to 300	3
300 to 400	--
400 to 500	3
500 to 600	1
$900 to $1,000	1

Receipts of $200 to $1,000 from outside work certainly do not reflect income due to farm efficiency. While some error is introduced by comparing full-time with part-time farms, it is not so serious as the error due to including farm-and-blacksmith or farm-and-rural-carrier incomes in studies of farm management as such.

The principal differences between the two methods of computation is in the charge made for the land and capital. By the labor income method, cash payments for taxes, insurance, and building repairs, and deductions for depreciation and interest, total $1,359; by operator's earnings method, the deduction to cover use of land and capital is but $594. By the first method, 37.6 per cent of the value of the product is imputed to the farm land and capital; by the second, only 15.5 per cent. This is the most important factor in making the average labor income come out but $49, as compared to $1,014 for the average operator's earnings. The labor income figure, plus the value of the farm products and the use of the house not specifically included, represents what the farmer has left for his year's work assuming that his capital earned as much as if invested in farm mortgages (and ignoring increase of land value). The second method shows what the farmer has for his year's work and the use of his capital and land, including the value of products furnished by the farm, less that part

of the product that might be fairly ascribed to the use of the land and capital as shown by what similar investments in farm land actually do return in the same region.

The essential difference between the two methods lies in the fact that by the second method the use of farm land and of farm buildings is valued just exactly the same as are all the other factors except the operator—at what they will sell for in the market. On the assumption that the prevailing market price for labor, materials, and the use of land does accurately measure the average or possibly "marginal" separate contribution of each factor in production, this method deducts out the contribution of all other factors and leaves the residual as a measure of the net contribution of the operator.

The term "operator's earnings" rather than "labor earnings" or "operator's income" was adopted because this measure shows what the individual operator has left for his year's *labor and management.* If the residual is very large, that does not mean that his *labor* alone was very productive, but that his *management* was successful. The term "earnings" was preferred to "income" for the connotation it carried of compensation for services rendered, rather than merely of monies received.

On the assumption that the operator can give an adequate estimate of the value of his labor as distinguished from the value of his managerial ability, one further step might be taken by deducting this from his "operator's earnings," leaving as a residual a payment for pure managerial ability, which might be termed "management earnings.[17] This would be a more delicate measure of farm success than the operator's earnings figure only where the variation in the actual worth of the operator's labor was greater than the variation in his estimates of its worth. Using the estimated cash values of the operator's labor in computing management earnings and correlating it with the same six factors which were previously used for the Chester County records, a multiple correlation of R=.779 was obtained. While a slightly higher correlation than obtained with per cent return on capital, this is significantly lower than the correlation with operator's earnings, in-

[17] For another approach to the earnings of management, see Holmes, John A., Jr., *Wages of Management,* Journal of Farm Economics, Vol. III, No. 2, 1921.

dicating that in this survey the estimates of the value of the operator's labor were not sufficiently accurate to justify this additional refinement. Where survey methods are used in gathering the data it is doubtful if the use of "management earnings" is justified.

As shown in Table I, not merely the cash value of the labor but the value of the perquisites has been considered in calculating management earnings. Since the cash value of the labor was obtained by asking each farmer, "What would you have to pay to get some one to do the physical work that you do, in addition to his having the use of the house and the garden, milk, etc., that you have?", the value of perquisites includes an estimate of the value of the house rent as well as the farm products used by the family. There may be some question as to the propriety of making the deduction inclusive of perquisites; but it is interesting to note that when the charge is made on that basis there is practically a zero for management earnings. That is, on the average, the year of the survey, the dairy farms in this region paid the operators a return equal to the cash value of their labor and the perquisites received, plus as much for the use of their land and capital as they would have received had the farm been rented at the current rate for cash-rented farms.

One further minor difference between the way operator's earnings and labor income were computed has little effect in the table of averages, but does make considerable difference on individual farms. The difference lay in making adjustment for "horse depreciation."

Losses due to the death or replacement of livestock have generally been simply charged in as part of the year's business. While this works out fairly well for dairy cows, where there are good-sized herds and losses therefore tend to average about the same, it is not so accurate for horses. If one or two horses die within a year, that makes a decided cut in the computed net income; if no losses occur, no charge is made for their use unless it shows up in the inventories, which are rarely sufficiently accurate to include that.

Though it is true enough that the farmer suffers the loss the year it occurs, still it is also true that he buys machinery some years, and not others. The expense for new machinery

is not charged to the business of the year; only the repairs plus the estimated average depreciation are included each year. The same method was adopted in handling horse costs in computing operator's earnings: the cost of replacing horses was not charged as it occurred, but instead each farm was charged a "depreciation" on horses sufficient to provide for their replacement. On the basis of the horses replaced during the year on all farms, the normal life of a horse in such work, and the average value of horses at the time, the charge was placed at $8.00 per horse per year. The actual horse expenses, due either to replacement or to inventory decreases, were eliminated from the operator's income computations.

The extent of the differences between the labor income and the operator's earnings figure for individual farms due to this one cause are shown in the following statement:

Operator's earnings in excess of labor income due to horse labor adjustment, by	Number of farms
$251 to $300	2
201 to 250	2
151 to 200	--
101 to 150	3
51 to 100	18
— 0 to — 50	22
— 1 to — 50	206
— 50 to — 100	15
— 101 to — 150	2

On the average for these farms the adjustment was $18 against operator's earnings; that is, the average replacement of horses on the dairy farms fell $18 short of meeting the estimated normal replacement. The very large number of farms showing minus differences represent farms on which no charge for the use of horses would have been made on the labor income basis, and on which the estimated depreciation charge was made by the new method.

The 25 farms showing operator's earnings better by $50 to $300 than their labor incomes, due to this adjustment, are farms on which horses had to be replaced, at a special cost reflected in labor income but not in operator's earnings. While for many farms this adjustment made but little dif-

ference, on others it made differences up to $300. The total range of the differences in labor income which were eliminated by this method is almost $500. The elimination of these differences which were in no way related to efficiency of farm operation, is one thing that helped make operator's earnings a more sensitive index than labor income.

While exactly the same line of argument would apply to cow depreciation, the differences are probably not so large, and the difficulties of making the adjustment, due to differences in values of cattle, the presence of young growing stock, and the like, are much greater. However, in work where a high degree of accounting technique can be employed, still further extension of the depreciation concept might be worth while.

Inter-relation of the several measures of income.—As evidence of the extent to which the different measures of income tend to vary with each other, it may be of interest to present the simple correlations between the several different measures. For the 270 Chester County records, the correlations were:

Correlation of	Per cent return	With Operator's earnings	With Management earnings
Labor income	+ .838	+ .907	+ .880
Per cent return	------	+ .887	+ .891
Operator's earnings	------	------	+ .971

The correlation between operator's earnings and management earnings, so much closer than between the others, indicates how little change in the variability of operator's earnings resulted from the further computation to secure management earnings.

Operator's Earnings versus Per Cent Return to Capital.—The fact that operator's earnings is not quite as closely correlated with per cent return on capital as with labor income shows that per cent return did not give a high correlation with the dependent factors because it was identical with operator's earnings. This correlation shows that 20 per cent of the variation in one factor is independent of the variation in the other. This brings up a point previously developed by other workers. Indexes of the type of either labor income or oper-

ator's earnings measure the success of the operator in associating the proper equipment and land with himself and in making good use of them; indexes of the type of per cent return on capital measure the returns of different farms on a business basis, including the "cost" of the operator as one of the charges, and making the net returns relative to the capital. In either case, however, the intelligence, good judgment, and industry of the operator are of great importance in determining the size of the index, and whether it is stated as "success" with regard to the individual or as "efficiency" with regard to the farm it is still largely a measure of the individual operator's ability and effectiveness.

As Hunter has pointed out, when the deduction for rent equals the average per cent earned on investment, operator's earnings and per cent return on capital tend to vary closely together without either being influenced by the size of the farm. Under other conditions, as when in an exceptional year the per cent actually earned was far above or far below the rents paid, it might be more desirable to use the per cent return figure to prevent serious bias in the conclusions as to the results for farms of different sizes. With the exception of such unusual conditions, however, it would seem that operator's earnings, as a nearer approach to what the operator really earns by his own ability, would be the better basis upon which to base conclusions as to the relative effectiveness of different methods of farm organization and operation.

Conclusion.—The financial success of an individual farmer may be measured by contrasting the results (stated in pecuniary terms), which he is able to achieve by his utilization of his farm, equipment, and the human labor available with the results which "marginal" men would be able to obtain from the use of the same resources. Market valuations must necessarily be used as the basis for both sides of the determination. Analysis of the assumptions involved indicates that of the different indexes suggested for measuring farmers' financial success, "operator's earnings" offers the most satisfactory basis for using the market valuations. In addition, the empirical statistical tests reported in this paper have shown the operator's earnings method to give more satisfactory results than alternative methods and to merit general adoption.

A FOUR-YEAR COLLEGE COURSE BASED UPON THE ECONOMICS OF AGRICULTURE

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In the last few years there has been a great deal of popular discussion of problems which relate to the economics of agriculture. Our agricultural colleges should properly have taken the lead in the consideration of these problems by conducting researches in agricultural economics by disseminating this information through the extension departments, and by providing well-organized courses of study in the various phases of agricultural economics for resident students within the college. It is doubtful if any of our agricultural colleges have come up to the reasonable expectations of their clientele either in the research, the extension, or the teaching departments of the college, in furnishing the needed and desired assistance in the solution of the economic problems which now confront agriculture.

The basic reason for the failure of agricultural colleges to respond more effectively to the relief of the economic distress of agriculture is that the agricultural curricula center almost entirely about the physical sciences and fail to give anything like adequate attention to the sciences dealing with human relationships such as economics, psychology, history and sociology.

Agricultural economics in most agricultural colleges is looked upon as an unimportant incident to the agricultural curriculum as a whole, since only one or two disconnected and very general courses are usually offered in this field. The department of agricultural economics, where one exists, is usually merely a service department for the purpose of furnishing information of general interest but of doubtful practical value. In a few colleges which have been pioneers in this field and where strong courses are offered in agricultural economics the work has been designed primarily for graduate students, and therefore fails to influence sufficiently the much larger number of undergraduate students who are in attendance at the college. It is the opinion of the present writer that

there should be two distinct four-year courses in agriculture, in one of which the physical sciences should predominate, but within which a series of connected courses in agricultural economics should be interwoven. In the other, the economics of agriculture with the directly related fields of accountancy and statistics should predominate, while the physical sciences should occupy a relatively minor position. It is in connection with the aim, scope, and general philosophy of the second type of curriculum as it is being worked out in the Agricultural and Mechanical College of Texas that this article will attempt to deal.

The Four-Year Course in Agricultural Administration

The Four-Year Course in Agricultural Administration in the A. and M. College of Texas is designed to train young men for service in the varied branches of the agricultural industry. This industry should no longer be viewed so narrowly as has hitherto been the case. The leaders of the agriculture of tomorrow must see the industry in perspective and in its manifold present and future relationships. We have recognized for some time that the commercial farm has displaced the old self-sufficing farm unit. It must become equally clear that an economic solidarity is developing among great numbers of individual farm units engaged in the same or similar enterprises. This solidarity is manifesting itself in ever-widening spheres of cooperative business organizations.

Again, the concept of the personnel of the agricultural industry must be widened to include many who are not engaged in the actual tilling of the soil, in the active management of the farm, or even in the employment of the farmer cooperative associations. It must include those employed in public and private agencies for the discovery and dissemination of agricultural knowledge such as employees of agricultural colleges, the federal Department of Agriculture, the farm press, and the public and private agricultural research institutions. In addition to the foregoing classes the personnel of the agricultural industry includes directly the business and the professional men in agricultural communities—especially bankers

and merchants—for these men simply perform specialized functions incident to commercialized farming in their communities; and indirectly it includes many men connected with the industries auxiliary to agriculture which have become localized in distant urban centers. For example, the sole function of such urban industries as farm machinery companies, fertilizer plants, feed companies, and the like, from an economic point of view, is to take advantage of the economies that result from division of labor and large scale production in the performance of tasks which formerly were carried on upon the individual farm homesteads. The foregoing statements suggest that we have a great variety of specialized functions in the agricultural field. The great need of the hour and of the future is to coordinate and unify these far-flung phases of the agricultural industry. Improper functioning of any of the specialized parts is quickly and adversely reflected to all other parts of the industry. We need, therefore, to train men who are able to think in economic terms upon our agricultural problems, particularly, of course, with reference to that phase of the industry in which they are to be directly engaged, but also with reference to the reaction of one part upon the other in the agricultural industry as a whole and of the mutual reaction of the agricultural industry and other industries upon each other.

Specifically we need to train men to become managers of estates—large and small; bankers and merchants with the agricultural point of view and possessing a certain minimum of technical information, but who are particularly well grounded in accountancy, statistics, economics, and business management; men for public service as agricultural economists, statisticians, and the like; potential managers of farmer cooperative organizations; secretaries of chambers of commerce, and county agricultural agents. The managerial personnel of industries auxiliary to agriculture should be composed of men trained with the agricultural point of view. The absence, in a large measure, of this condition has bred distrust between these different phases of the agricultural industry which although legally independent are, nevertheless, economically closely interdependent. This distrust on the part

of the farmers of those who are performing specialized functions in the agricultural industry, began with the very inception of commercialized farming and has had a tendency to increase ever since. It will continue to exist so long as a great percentage of the men engaged in directing enterprises auxiliary to agriculture fail to recognize their true place in the scheme of things and so long as they are dominated by the acquisitive rather than by the productive impulse.

The underlying philosophy which dominates the course in Agricultural Administration in the A. and M. College of Texas is based upon the general line of reasoning briefly sketched in the foregoing pages. In preparing the curriculum an attempt was made to give due consideration to psychological and pedagogical principles from the teaching standpoint as well as to offer courses that would furnish the desired material for the general purpose in view. Accordingly the subjects offered in the course may be divided into four main divisions:

Basic sciences, about 15 per cent of the total.

Economics of agriculture (including general economics), about 45 per cent of the total.

Technical agriculture, 20 per cent of the total.

Literature and history, 20 per cent of the total.

This classification may be regarded as the norm from which there will be some variation in accordance with the needs of individual students. The principal characteristics of the course are the wide scope allowed for electives and the dominance of work in the field of the economics of agriculture.

Referring to the course of study it will be seen that the work of the freshman year is all prescribed and that it consists in the main of the basic sciences, chemistry, biology, mathematics, and English. The only exception is Agricultural Resources, a course running through the year and consisting in the first semester of subject matter designed to give a world perspective with reference to the world's land supply, climatic conditions, food resources, and trade routes. The second semester is given over to a study of our agricultural resources as handed down to us in the form of knowledge and institutions

from the past—in other words the story of our agricultural heritage. Suitable map work and other aids to study are provided. This subject is designed to lay the foundation for all subsequent work in agricultural economics. In the sophomore, junior, and senior years the *prescribed* work is entirely within the field of general economics, agricultural economics, and English. The remainder of the work is elective and constitutes nearly half of the student's schedule in the sophomore year and three-fifths of his schedule in the last two years. These electives are chosen under the direction of the head of the course. At least twelve credits out of a total of one hundred and thirty-six academic credits required for graduation must be *elected* from such technical departments as agronomy, animal husbandry, and horticulture. Another restriction upon the electives is that a minimum of fifteen *electives* must be chosen from the fields of agricultural economics, general economics, and mathematics. After deducting the required subjects and the *restricted electives* there remain twenty-five hours out of the one hundred thirty-six academic hours as free electives. A portion of these free electives are always chosen from the fields of history and English, and as a rule another considerable part is generally taken as additional electives in the field of agricultural economics.

COURSE IN AGRICULTURAL ADMINISTRATION

Freshman Year

	Hours per week			Hours per week	
	Th.	Pr.		Th.	Pr.
Agricultural Economics, Agricultural Resources	3	0	Agricultural Economics, Agricultural Resources	3	0
Biology, General Botany	2	4	Biology, General Botany	2	4
Inorganic Chemistry	3	3	Inorganic Chemistry	3	3
English, Rhetoric and Composition	3	0	English, Rhetoric and Composition	3	0
Mathematics, Algebra	3	0	Mathematics, Algebra	3	0
Military Science	1	2	Military Science	1	2
	15	9		15	9

Sophomore Year

Agricultural Economics, Accounting	1	4	Agricultural Economics, Accounting	1	4
Economics, Principles	3	0	Agronomy, Crop Production	3	2
English, Composition	2	0	Mechanical Drawing	0	3
Military Science	1	2	Economics, Principles	3	0
*Elective	10		English, Composition	2	0
	17	6	Military Science	1	2
			*Elective	5	
				15	11

Junior Year

Agricultural Economics, Statistics	2	4	Agricultural Economics	2	2
Economics, Money and Banking	3	0	Economics, Business Law	3	0
English, Argumentation	1	0	English, Argumentation	2	0
*Elective	12		*Elective	12	
	18	4		19	2

Senior Year

Agricultural Economics, Marketing	3	0	Agricultural Economics, Property and Contract	3	0
Agricultural Economics, Farm Management	2	4	English, Public Speaking	1	0
English, Public Speaking	1	0	*Elective	16	
Rural Sociology	2	2		20	0
*Elective	10				
	18	6			

*ELECTIVES.
The electives must be chosen subject to the restrictions stated below:
(1) A minimum of fifteen (15) term-hours from the following:
Agricultural Economics 203, 303, 313, 419; 322, 404, 410, 412, 414, 416, 424; Economics 408; Mathematics 103, 203, 207, 301; 104, 106, 204, 208; 302.
(2) A minimum of twelve (12) term-hours in technical agriculture to be taken in the departments of Agricultural Engineering, Agronomy, Animal Husbandry, Genetics. Horticulture, Poultry Husbandry.

Coordination of Courses

Throughout the course there is a careful coordination of subjects. In the field of economics an effort is made to strike a proper balance between the quantitative and qualitative phases of the subject. It is coming to be generally recognized that accountancy and statistics must be made to serve as tools for the agricultural economist, while the descriptive and the-

oretical side of agricultural economics must furnish the guiding principles for action. In addition to the one year of required work in the principles of accountancy the student may elect advanced courses in both the junior and senior years. Similarly, in addition to the course in statistical methods a course is offered in advanced statistics with special reference to agricultural problems. As a basis for the advanced courses in accountancy the department of mathematics offers a course in the mathematics of investments, and as a basis for the course in advanced statistics a special course has been prepared by the department of mathematics including enough work in trigonometry, analytics, and calculus to enable the student to attack with facility, statistical problems involving the use of advanced mathematics.

Elective courses are offered in such subjects as taxation, transportation, agricultural finance, land economics, cooperative marketing, and the like. Our experience leads us to believe that a happy balance has been struck between the quantitative and the qualitative or descriptive side of economics on the one hand and between the economic and technical side of agriculture on the other. Not only are students taking a greater interest in the economics of agriculture but several hundred students are taking technical courses in agriculture and developing an interest in these courses who would not be in the school of agriculture at all if it were not for the opportunities offered in the course in agricultural administration.

The liberal system of electives provided for in the course results in varying proportions in the relative amounts of the economic and technical subjects chosen by students, depending upon the way they incline toward the different aspects of the agricultural industry. They almost invariably display a much greater interest in the subjects they elect than in the ones they are required to take, although the former often require much more effort on their part. This fact seems clearly to justify the wide scope of electives provided in the course.

Progress and Problems

The Course in Agricultural Administration will, in June, 1926, have rounded out four years of operation. The depart-

ment of agricultural economics, which constitutes the "hub" of the course, was organized a year later. The former now has an enrollment of nearly four hundred, the latter nearly seven hundred students. It is evident from this that a large number of students other than those enrolled in agricultural administration elect courses in this department. Fourteen graduate students are carrying on their major work in the department and will receive their M. S. degreee in agricultural administration.

The problems incident to such rapid increase in student enrollment and the introduction of courses of study adequate in a measure, at least, to the attainment of the objects outlined above are not easy of solution. These problems are still further complicated because of the powerful traditions that have grown up during the past fifty years of curriculum building in which the economics of agriculture was almost totally disregarded. A great deal of inertia, due to the crystallization of agricultural college curricula around disconnected technical fields of work, must be overcome before the economics of agriculture can perform its proper function of unifying agricultural education by tying together the loose ends in its various divisions, so that the teaching, extension, and research activities of the college will all be directed toward increasing the economic well-being of those engaged in the agricultural industry.

The problem of properly apportioning the funds which are made available for carrying on the work in agricultural colleges has, it appears, scarcely been touched in many agricultural colleges. It is impossible to give students any adequate conception of the magnitude of such problems as marketing, land economics, statistics, accountancy, agricultural finance, taxation, transportation, and the like in the ordinary agricultural college curriculum. As a rule only a few general courses are given in these fields, frequently as a sort of concession to the insistent demands coming from those who are in closest touch with the real agricultural problems. In such cases the presentation of the work must necessarily be so superficial that it fails to interest the better students. To bring instruction in the economics of agriculture to anything like the de-

gree of saturation that prevails in other branches of the agricultural curriculum will require a radical revision of the curriculum in many cases. But certainly the little that is now expended in giving instruction in the economics of agriculture in many agricultural colleges involves entirely too thin a distribution of energy and funds over so broad a field. It is as if we were to give a field of corn or cotton one cultivation when the best returns would be attained by giving it five.

The experience of this college seems to bear out the fact that it is the failure of agricultural colleges to provide the type of curricula which our most discerning young men demand that has accounted for the decrease in numbers of students both absolute and relative in agricultural colleges during the past few years; and not, as some who have expressed themselves upon the subject have explained, the decline in farm prices of the past few years. It is probable that many other agricultural colleges would have had an experience similar to that of A. and M. College of Texas if proper recognition were given to the economics of agriculture, with that term given its proper interpretation.

Two four-year courses in the school of agriculture are offered at this college at present. It may be of interest to compare the figures of enrollment by classes in the two courses, the figures being as of March 1, 1925:

	Regular Course in Agriculture	Agricultural Administration
Graduate	16	14
Senior	64	47
Junior	68	58
Sophomore	72	106
Freshman	88	139

The total number of students in the school of agriculture has practically doubled in the past four years and the student interest in both the technological and economic aspects of agriculture has greatly increased. Moreover, departments such as mathematics, history, and general economics which were formerly considered as having but a remote relation, if any,

to agriculture are now developing a greater student interest because of the services they are able to render. For it is clear that a student can not go far in advanced statistics and accountancy without a good mathematical foundation; history and psychology aid in the understanding of general economics; and a knowledge of the principles of general economics makes the more specialized courses in agricultural economics much more significant than could otherwise be the case.

A sequence of subjects so arranged as to afford a substantial framework of principles in both the natural and social sciences, combined with elasticity in the choice of electives in order that the student may, as far as possible, follow his natural bent and prepare himself for the specific work he intends to enter, was the aim in framing the curriculum outlined above. The proper functioning of such a curriculum, of course, involves a carefully administered advisory system.

A quotation from the address of President Coolidge at the International Livestock Exposition in Chicago last December is significant of the new responsibility placed upon agricultural colleges: "Inasmuch as orderly production is a necessary preliminary to orderly marketing, the well-informed farmer must keep himself posted, months in advance, concerning the probable production of various kinds of livestock during the coming season, as well as concerning the probable requirements of the market."

Forecasting the probable supply and demand of farm products implies forecasters; this implies men who have not only a knowledge of the technique of statistics, but who know their economics, who possess the highest intellectual integrity, who know something of the technology of agriculture, and who have the foregoing essential ingredients properly combined and seasoned with a liberal amount of common sense. Moreover, another set of men with somewhat different qualifications, such as agricultural agents and employees of farmer cooperative organizations for field service work, is needed to convey this information to the farmer if practical results are to be obtained. This suggests that our agricultural curricula must make provision for the training of men who will fit into the wide range of special requirements now revealing them-

selves, as agriculture becomes more and more commercialized. It can no longer be said that the capable agricultural youth of the land must seek urban industry to find scope for the expression of its genius; for nowhere are there greater problems for solution than in both the technical and economic aspects of agriculture. The former can not advance far beyond the latter and that is why, in the next decade or two, at least as much emphasis if not more must be placed upon the economic as upon the technological subjects in the preparation of agricultural college curricula. For the agricultural industry has been plunged into the 20th century maelstrom of commercialism unprepared; agricultural policies—nation, state, and local—must be worked out and this involves careful preliminary researches into problems relating to farm management, land tenure, marketing, transportation, taxation, cooperation, land settlement, and land utilization. Moreover, many of these problems should be attacked simultaneously because of their close inter-relation.

Because of the character of the agricultural industry, any agricultural policy involves the cooperation of a large number of people in specialized lines of activity. An agricultural policy for even a local area requires the joint action of bankers, merchants, farmers, and other groups. A state policy would bring in still other groups and a national policy, others still. For these reasons, with all of their implications, the agricultural colleges must provide curricula adequate for the preparation of virile men who have a vision of the true scope of the agricultural industry and who are qualified to perform these specialized functions efficiently.

Not less technology but more economics of agriculture is needed in our agricultural college curricula. A four-year course that attempts to include them both in equitable proportions will be deficient in each. The situation can be met most effectively by the creation of two four-year curricula in one of which the technological subjects predominate and in the other the economics of agriculture. In this way the agricultural colleges can best prepare leaders for the great variety of specialized work which is so rapidly developing in the agricultural field.

THE INTERMEDIATE CREDIT BANKS

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The question has been raised as to whether or not there has been too much legislation for the American farmer along the line of credit.[1] In particular, it has been suggested that the part of the Agricultural Credits Act of 1923 creating the federal intermediate credit banks was unnecessary, since these banks constitute a piece of surplus machinery in our financial system, making loans which could well be made by the regular commercial banks.[2]

Critics of this piece of so-called "agricultural-bloc" legislation create an incorrect impression in describing it as a hastily prepared bill thrown together at the last moment of existence of the Sixty-Seventh Congress. True, the Capper-McFadden and Lenroot-Anderson bills were hastily thrown together and passed, but both were based upon fundamental conclusions reached from intermittent hearings and Congressional committee investigations and individual studies which had been in progress since 1913.[3] Among the conclusions reached from these investigations were: (1) that farmers were not being adequately supplied with capital for certain types of farm operations; (2) that the real cause for this inadequate financing was due in part at least to the fact that the commercial banking machinery of the country was ill-adapted to making certain loans for the periods required by the farmer; and (3) that the cost of farm loans was disproportionately high in comparison with the loans acquired for operating purposes in other industries.

In spite of the rather crude construction of the final bill which became the Agricultural Credits Act, it provides for farm financing machinery which it seems is destined to fill a

[1] Benner, Claude L., *"Has Rural Credit Legislation Gone Far Enough and in the Right Direction?"* Journal of Farm Economics, January, 1925.
[2] Willis, H. Parker, *Hoodwinking the Farmer*, The Annalist, Vol. 22, p. 723.
[3] See Congressional Hearings on Rural Credits, 1913-1914; Hearings before the Subcommittee on Banking and Currency, 1913; Hearings before the Subcommittee of the Joint Committee on Rural Credits, 1915; Hearings before the Joint Commission of Agricultural Inquiry; Hearings and Memoranda of the Joint Congressional Committee on Rural Credits, 1921; and Hearings before the Committee on Banking and Currency, 1923; also, United States Department of Agriculture Bulletins No. 409 and 1048; University of Wisconsin Bulletin 247; and, Cance, A. E., in Report of Conference on Marketing and Farm Credits, 1915.

very important place in the financial system of the country. Certainly the Intermediate Credit Bank supplies a channel through which farming communities may have direct access to the investment markets of the country. Through the issue and sale of bonds this new bank can with ease make livestock loans and other of the longer term loans, which are not well adapted to the regular deposit bank. And, finally, because of the large scale on which they operate, the issues of securities for periods adapted to the length of loans desired, and the tax-exemption feature of these bonds, the intermediate credit bank can and is supplying many farmers and ranchmen with funds at very considerably lower interest rates than would be required by commercial banks.

Summary of the Operations of Intermediate Credit Banks

From their organization about the middle of 1923 to the end of 1924 the twelve Federal Intermediate Credit Banks made direct loans to farmers' marketing associations amounting to more than $90,000,000, serving approximately 700,000 individuals. They had loaned other farm financing institutions approximately $43,000,000 by rediscounting 19,567 farmers' notes.

Of the amount of the loans to cooperative marketing associations outstanding at the end of 1923, 47 per cent was on cotton, 24 per cent on tobacco, 16 per cent on raisins and prunes, and 8 per cent on wheat. At the end of 1924 these proportions had changed somewhat. Cotton associations at this time had 31 per cent of the direct loans, tobacco associations had 47 per cent, raisins and prunes 13 per cent, and wheat 6 per cent. In both years associations handling these products had over 95 per cent of the total direct loans of the Intermediate Credit Banks. All direct loans to farmers' cooperative marketing associations have been made at 4½ and 5 per cent.

These banks loaned approximately $43,000,000 to farmers and ranchmen by rediscounting their notes for banks, cattle loan companies, and agricultural credit corporations. Of the total amount of rediscounts outstanding December 31, 1924,

42 per cent was secured by cattle, 37 per cent by other livestock, and 21 by other agricultural products in general. These notes were rediscounted at 5 to 5½ per cent, which means that the farmer and ranchman paid from 6½ to 7½ per cent, since the bank or company supplying this paper has been allowed a two per cent margin on livestock loans and 1½ per cent on other paper.[4]

The Intermediate Credit Bank and Operating Credit in Farm and Ranch Production

The Intermediate Credit Bank issues bonds of a duration of 3 years or less and is, therefore, adapted to the financing of (1) certain farm and ranch production operations requiring considerable periods of time and (2) certain phases of the business of cooperative marketing of agricultural products. Even if we assume that in the first case commercial banks can properly supply the farmer's operating credit needs, except in such cases as beef-cattle raising, dairy-farming, and in the purchase of fertilizer, the turnover in all these covering a period of one year or more, these alone are sufficiently important to require the most economical financing which can be made available.

There seems never to have been any question about the ill-adaptability of the ordinary commercial bank in carrying stock and dairy cattle loans. It was largely for the purpose of making such loans that the War Finance Corporation was kept in operation after 1921, and the bankers in the ranching sections of the country will testify to the great relief they received from this organization which was able to assist the cattlemen through the depression of the period following the 1920 slump in meat prices. Moreover, during more normal times in the cattle industry many of the leading livestock loan companies have been organized by bankers to provide for capital to loan to cattle men through the sale of their notes to the investing public, rather than burden the deposit banks with this so-called frozen credit. Reliable reports indicate that at the present time certain San Francisco and Los Angeles

[4] Seventh Annual Report of the Federal Farm Loan Board, p. 6.

bankers are assisting in organizing a national agricultural credit corporation for the purpose of handling livestock paper. Also, Arizona bankers are interesting themselves in the organization of a livestock loan company with the purpose of making use of the services of the Berkeley Intermediate Credit Bank. Numerous other individual cases could be cited.

One illustration will suffice to indicate the possibilities of the Intermediate Credit Banks in financing the farmers' purchase of fertilizer and the like. In the Columbia Federal Land Bank district, which includes the Carolinas, Georgia and Florida, groups of bankers have combined to form agricultural credit corporations through which to finance the purchase of fertilizer. Heretofore, the fertilizer companies have extended this credit, but since loaning money and making collections were out of their immediate line they have been charging excessive prices to cover losses. Bankers, knowing the individual farmer, are cooperating in the placing and the collection of intermediate credit bank loans, and as a result they are able to effect a handsome reduction in the price of fertilizer without suffering any shrinkage in their general business. There are many such examples over the country which illustrate the far-reaching possibilities of these banks to fill an important place in financing farm production which could not be, or at least was not being, filled by the commercial banks.

The Intermediate Credit Bank and Cooperative Marketing

Successful cooperative marketing hinges largely upon economies to be achieved through integration, and financing the product through the several steps in the marketing process becomes one of the greatest problems of the cooperative concern. The ordinary cotton farmer, for instance, is not in a position to wait from three to twelve months for his payments. The association must make him an advance. This means borrowing on the basis of warehouse receipts. The interest paid upon these loans is one of the chief items of cost to be deducted from the gain in the price the association receives for cotton by marketing at most opportune times through the year. This financing is at present costing the Texas cotton

farmer 4½ per cent interest as contrasted with at least 8 or 10 per cent which he would pay his local banker were he to decide to hold his cotton individually for better market conditions.

It is a well-known fact that most of our cooperative marketing organizations have received very little encouragement from commercial bankers until recently, in fact, not until the War Finance Corporation and the intermediate credit banks began loaning heavily to the associations. Now commercial banks clamor for the opportunity of doing a share of the financing of such cooperative concerns, for instance, as the Texas Farm Bureau Cotton Association and the Connecticut Valley Tobacco Association. But even since these organizations are well on their feet and commercial bankers are anxious to help finance them, there is a part of their loans which can most economically be made for periods beyond that desired by the commercial bank. Since commodities are marketed throughout the year, the periods for which loans are needed to carry the product range from a few days to twelve months or, sometimes, even longer.

An excellent illustration of the proper functioning of the intermediate credit bank in assisting in financing cooperative marketing organizations is that of the Connecticut Valley Tobacco Association. The tobacco handled is almost exclusively for cigars and a great deal of it requires two years to process and prepare for the market. Local banks in the Connecticut Valley loan the association on very short term unsecured notes the funds which are necessary to put the tobacco in the warehouses and sort it so that it can be identified under warehouse receipts. Certain New York and Boston commercial banks have a syndicate which makes loans for sixty to ninety days secured by warehouse receipts as soon as they are available, usually from March to June following the harvest of the crop running through to the following September. Then the Federal Intermediate Credit Bank of Springfield loans the Association money for periods from six months to one year on the security of warehouse receipts for tobacco which is one year old. These loans enable the Association to carry tobacco up to the time the manufacturer is ready to use

it. There seems to be a thorough understanding among the local banks, the larger city banks, and the Intermediate Credit Bank that each group has its particular and proper function in the financing of this organization.

The Question of Policy

Granting that the Federal Intermediate Credit Banks are able to supply the farmer credit for periods of six months to three years at a substantially lower rate than the regular banks or the merchant, and to eliminate the expense and inconvenience of frequent renewals, there remains the question of policy. Since these institutions were arbitrarily established by the federal government, and not by private initiative, it is of course an open question whether such action was justified, and whether the banks should be permitted to continue operation. There are three angles to the question: (1) What will be the probable effect of this cheaper credit upon the farmer himself? (2) What will be the probable effect of these new government established institutions upon the country bank? (3) Is the government justified in the establishment of these banks, the purchase and ownership of their stock, and in making their securities exempt from taxation?

The Farmer and Cheaper Credit

It is often intimated that if the farmer should get more and cheaper credit there would be a great amount of extravagance and his condition in the end would be worse than in the beginning. This is a result of confusing lower interest rates with slack loan practices or even government doles. An examination of the loan policy of the Intermediate Credit Banks during the past two years will show that loans are made only in cases in which the most excellent security is supplied. As long as this policy is maintained there is about as much point to the suggestion that this cheaper credit will be detrimental to the farmer as to say he is getting labor and land too cheaply, or that he is getting too high prices for his products. More correctly, the lower rates simply make possible a reduction in the farmer's cost of production.

The Intermediate Credit Banks and the Local Country Bank

The Intermediate Credit Banks have been established as supplements to the ordinary farmers' banks and not as their competitors. They are designed to make farm and ranch loans which are too large to be conveniently handled by the small banks and to supply funds which are needed for longer terms than can be economically supplied by the deposit bank. The resources of the small country bank are particularly strained in making certain cattle loans, both because of the size of the loans desired and because of the length of time for which their funds must be tied up. The same thing is often true in the case of the loans required by farmers' cooperative concerns. The over-extension of such loans is frequently the cause of failure of the smaller banks. Regardless of the extensive efforts to induce the smaller state banks to become members of the Federal Reserve System, a relatively small number have become members. This means that in order to secure Federal Reserve funds, that is, to tap the real central sources of commercial credit, the small non-member farmers' bank must rediscount with a member bank which, in turn, gets its surplus funds from the Reserve Bank. In addition to the disadvantage of this roundabout process of rediscounting, the correspondent member bank is reluctant to loan money for more than ninety days. This leaves the small bank to make a large share of the longer loans from its own resources.

It is hardly probable, therefore, that the small country bank will suffer any extensive hardship in being relieved of a part of the larger and the longer term loans. Certainly the small state banks of the present have far less to fear from the introduction of the Intermediate Credit Banks than did the state banks in the 1860's when the national banking system was established as a direct competitor to the then existing state banks. Furthermore, the note-issue privilege of the former was completely wiped out by taxation and given over to the highly pampered national banks. Still the state banks exist and thrive.

It is entirely probable of course that the commercial banks will be deprived at times of the opportunity of making certain

loans which they desire to make, but it does not follow at all that they will suffer in the long run from this outside financing. A normal growth of the business of the Intermediate Credit Bank should be followed by a gradual adjustment of the business of the local bank strictly to the handling of the shorter loans to which by their nature as deposit banks, they are best adapted.

Up to the present time the local commercial banks in general have taken little or no interest in the development of the Intermediate Credit Banks, and it seems that in the great majority of cases in which any interest has been shown, it is adverse to the new institutions. The law establishing the Intermediate Credit Banks provides for the rediscount of farmers' notes which are endorsed by commercial bankers. It was thought that since the local banker knows the borrowers and the financial conditions of his community his bank would be a most logical channel through which to supply funds for the intermediate terms. It is not surprising, however, that commercial banks had furnished less than five per cent of the rediscounts held by the Intermediate Credit Banks at the end of 1924, since the regulations of the Federal Farm Loan Board have allowed the local bank a maximum margin of only two per cent on such loans.[5] Moreover, the Federal Reserve Banks have no such strict regulations regarding the margin allowed to the member bank. Hence, it is to be expected that ordinarily the member bank would much prefer to do all its rediscounting with its reserve bank. This accounts, in part at least, for the fact that approximately 95 per cent of the rediscounts held by Intermediate Credit Banks December 31, 1924, were made through livestock loan companies and agricultural credit corporations, rather than through the local banks.

It can scarcely be asserted, however, that the livestock loan company and the agricultural credit corporation have any undue advantage over the local banks because of the tax exemption of the securities of the Intermediate Credit Bank, since the actual rates (5 to 5½ per cent) charged are ordinarily

[5] The margin allowed by the Act was 1½ per cent, but the limit has been raised to 2 per cent on livestock paper by the Federal Farm Loan Board under its discretionary powers. See *Seventh Annual Report of the Federal Farm Loan Board.* During 1925 an interest rate of 2½ per cent has been allowed on livestock paper.

higher than the commercial bank pays for rediscounts with its reserve bank. The fact is, of course, that the Intermediate Credit Banks were never intended as competitors for loans which the ordinary bank can economically make. It is, however, the purpose of the administrators of these banks to eliminate, if possible, the basis for the assertion often heard among bankers that rates on farm and ranch loans must be high due to their non-liquid character.

Farmers Subsidized

The Intermediate Credit Banks are a subsidy to the American farmers to the extent that the federal government owns their capital stock and has made their securities exempt from taxation. The government ownership of this stock should, however, be distinguished from the more popular implication of the term "subsidy," as an outright gift. In the case under consideration the government has an investment, upon which a return is expected.[6] Furthermore, this form of subsidy should not be confused with the policy of making so-called "state loans" to farmers, whereby the state issues bonds upon its own credit and makes loans at very low rates. In supplying the capital stock for the Intermediate Credit Bank the government has merely started the business off by furnishing the required initial investment. The $24,000,000 of stock which had been paid at the end of 1924 is only a basis for the bond-issue banking business. At the same time bonds amounting to approximately $50,000,000 were outstanding.

Nevertheless, the fact remains that this is a form of subsidy, and a subsidy can be justified only on the basis of its effect upon the well-being of the public in general. Such a subsidy as the protective tariff is achieved through an increase in prices of the commodities to the consumers within the country, while the subsidized banks are designed to reduce the farmer's cost of production, not at the cost of the public, but on the basis of an initial government investment which yields a return.

[6] During 1924 the net earnings of these banks amounted to 4.4 per cent on the $24,000,000 of capital stock which had been paid in.

The objection is sometimes advanced that in the establishment of these banks the government is interfering in a business which should properly be left to private initiative. But we have long recognized that banking is a business which must be rather strictly regulated and supervised. Specifically, if the interest rates paid by the farmers of certain sections of the country are distinctly out of line, it might be well to supply a bit of competitive influence, even if the government must do it.

It takes no great stretch of the imagination to reconcile the policy of the government in the establishment of the Intermediate Credit Banks and that of establishing the Federal Reserve system with its very extensive control over the policies of the private financing concerns of the country. National banks were required to join the system, or give up their charter. The government, likewise, interfered greatly with private bankers' affairs when the note-issues of state banks were taxed out of existence.

The tax-exemption feature of the Agricultural Credits Act of 1923 was of course inserted to assure a market for the bonds of the new banks. This is a rather drastic method and as a policy must stand or fall with the general policy of subsidizing farmers in extending their opportunities to obtain cheaper credit. It is not at all probable that the banks would have been able to make any substantial progress had it not been for the attractiveness of their tax-exempt securities. This feature was particularly helpful to the banks since they were established at a time when there was an exceptional premium on tax-exempt securities due to the high surtaxes on large incomes. It should be emphasized that with the gradual reduction of income tax rates the relative advantage which the tax-exemption feature gives these banks will decrease, and it is entirely probable that this particular advantage is given too much weight at the present time. Once the debentures of the Intermediate Credit Banks are well known among investors as sound security, the tax-exemption feature will have served its function and, it seems, may well be discarded without jeopardizing their successful operation.

NOTES

THE PRICE AND PURCHASING POWER OF FARM LAND

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The prices of farm land have continued to fall in all the great agricultural sections of the United States since 1920. During the seventy years prior to 1920, the prices of farm land receded but once, and this decline continued for less than a decade. The farm lands of the upper Mississippi Valley had never fallen in price, but had mounted steadily until the present decline began in 1920. The large future element in the price as well as that part of the price based on current income have been adversely affected by the uncertainty with regard to the future and by the unfavorable returns of the past four years. With increasing costs and falling prices of farm products as an immediate experience after the war, faith has been somewhat shaken in the future prospects of farm profits. This lack of the usual optimism has been reflected in the falling prices of farm land.

Rising prices of agricultural products in the fall of 1924, tended to revive the hope that the returns from farm land would again make a steady advance which would give the basis for the continuance of the high prices of land and the low rates of capitalization of current incomes. This optimism has manifested itself in the recent slight advances in the prices of farm land in some of the great grain-producing states.

Trends in Prices and Purchasing Power—The average price of $204 per acre of Illinois farm land with improvements in 1920, had fallen to $143 per acre in the early part of the year 1924. This was a decline of 30 per cent. For the United States as a whole the fall in price of farm land was 27 per cent. This decline in price represents about two-thirds of the total rise which occurred from 1913 to 1920.

It is true that the price of Illinois farm land, in terms of dollars, was 15 per cent greater in 1924 than the price in 1913, but measured in terms of purchasing power (based on all commodity prices)[1] Illinois land has remained below the level of 1913, since the year 1915. The lowest point in the purchasing power of Illinois farm land was reached in 1918, when one acre would buy but 61 per cent as much in commodities as in the year 1913. For the year 1923, and early months of 1924, the purchasing power remained between 76 and 80 per cent. To the casual observer of prices alone this drop in the real value of farm land has not been apparent. Substantially the same purchasing power obtains for the farm land of the United States with the exception of the cotton

[1] United States Department of Labor, *Monthly Labor Review*.

producing states. Figures 1, 2, 3, and 4 illustrate the trend in the price and purchasing power of farm land during the pre-war and post-war periods. Present prices of farm land in all the great grain and hay producing states indicate a loss of 20 per cent of their 1913 exchange value. On the other hand, the cotton states as a whole have maintained and slightly exceeded the 1913 level. The New England, Mountain, and Pacific sections have all lost in purchasing power about equally, the percentage for 1923 being but 78 per cent of the pre-war figure.

Some questions may arise as to the value of such a concept as the "purchasing power of farm land." It is, of course, merely a function of the different behaviors of the curve of all commodity prices and land

FIG. 1: INDEXES OF THE PRICE OF FARM LAND WITH IMPROVEMENTS IN THE UNITED STATES AND ILLINOIS 1913-100

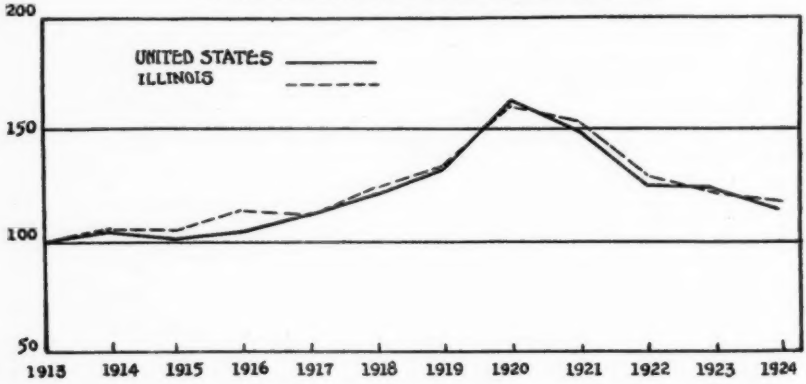


FIG. 2.- INDEXES OF THE PURCHASING POWER OF FARM LAND WITH IMPROVEMENTS IN THE UNITED STATES AND ILLINOIS 1910-14 = 100

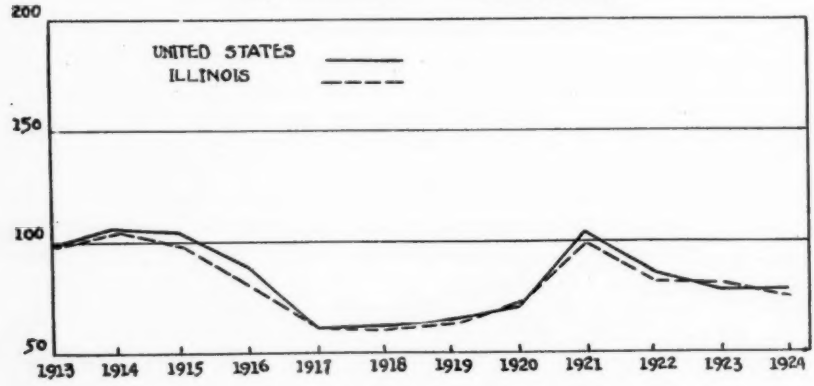


FIG. 3: INDEXES OF THE PURCHASING POWER OF FARM LAND WITH IMPROVEMENTS FOR THREE AGRICULTURAL DIVISIONS OF THE UNITED STATES

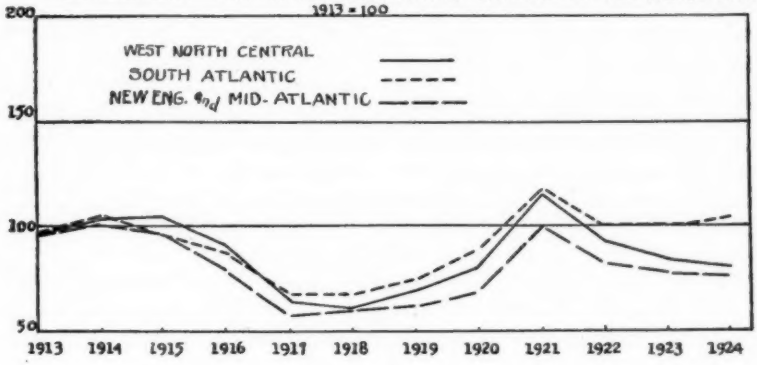
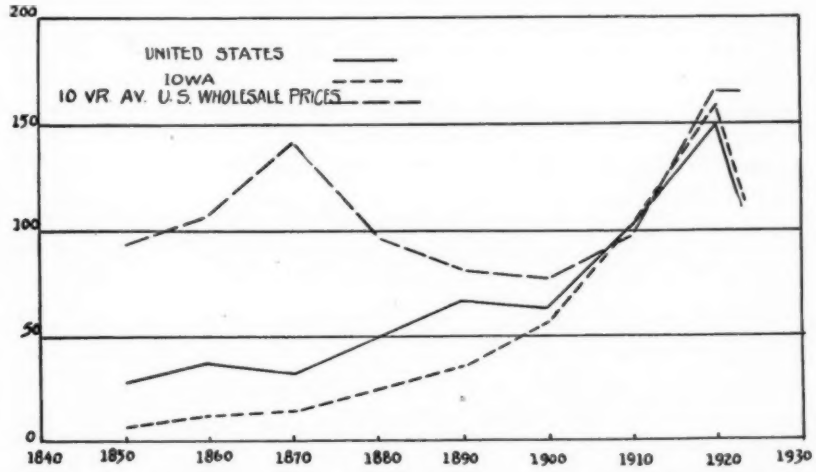


FIG. 4: INDEXES OF THE PURCHASING POWER OF FARM LAND WITH IMPROVEMENTS FOR THE UNITED STATES AND IOWA FROM 1850 TO 1920 1910 = 100



values. To show their relationship requires an historical analysis of the forces responsible for the behavior of both curves. Many special factors influence the price of farm land, and while one factor may be dominant at one period, it may play a minor role at some later time. However, one general principle may be observed as operating under all the varied conditions of different periods. It may be stated thus:— *The prices of farm lands are directly dependent upon the margins of difference prevailing in the present and the margins of difference expected in the future, between the prices received for agricultural*

products and the costs of production, transportation, and marketing. Any change or force which modifies any of the above prices or costs, or which modifies the prospects of their continuance, influences the present and prospective margins of profit[2]; such margins of profit being the basis of prices of farm land. That this influence of the margins of profit on the prices of land is somewhat tardy has been shown by a recent study.[3] According to this study, farm land prices tend to reflect the margins of profit just previous to the time of sale plus the anticipated increases in such margins as manifested by the past increases of the preceding 7 to 10 years. That this reaction of the prices of land to the margins of profit is tardy, does not invalidate these margins as the dominant force sustaining the price of the land.

From 1870 to 1890, the prices of farm land in the United States rose slowly but steadily, in spite of the decline in all commodity prices and the greater fall in the prices of agricultural products. That prices of farm land could rise during this period was not, therefore, due to increasing prices of produce, but to the great improvements in production, transportation and marketing. These improvements reduced the expenses and left an ever increasing margin of profit as a basis for land prices. Great progress in improvements was the dominant force of this period of rising prices of farm land.

During the period between 1890 and 1914, the advancing all-commodity-price-level assumed a leading part in increasing land prices. Improvements were rapid, but of much less importance than in the preceding decades. Furthermore, agricultural products rose in price more rapidly during the later part of this period than did prices of non-agricultural commodities.

During the period of the world war, the rise of all commodity prices was so rapid as to overshadow all other forces tending to increase the margins of profit. This upward tendency was aided to some extent by improvements, and moreover, was reinforced by the lag in the rise of the costs as compared to the rapid rise of the prices of agricultural products. When these tendencies became apparent to the public, a sufficient basis was found for the phenomenal rise in the prices of farm land in the summer of 1919.

From 1917 to 1919 the price of agricultural products continued to rise more rapidly than the price of non-agricultural products. This left an increasing margin of profit. Since 1920, however, the margin left as a basis for land prices has been greatly diminished. This is a direct result of the rapid fall of all commodity prices, of the more rapid fall of the prices of agricultural produce as compared to other goods, and of the lag in the fall of the costs as compared to the fall in the prices received for farm products. This lag in the fall of the costs was a result of relatively slight declines in the costs of labor and manu-

[2] The term "margin of profit" is used in the sense of net income from the farm enterprise rather than that of contractual net rent.
[3] United States Department of Agriculture Bulletin Number 1224.

factured goods. Taxes and interest remained high also. The total decline in costs from the high point in 1920 occurred in 1921, but since that time the costs have continued to rise slowly and have contributed to the steady fall in the prices of farm land.

Although the all commodity price curve has shown a very imperfect correlation with the price curve of farm land, there are certain facts and tendencies which may be revealed by a computation of the purchasing power of farm land on the basis of all commodity prices. The curve of the purchasing power of farm land has the merit of indicating the economic strength of farm land owners at a particular time. It may be used also as a measure of the trends in the economic position of the land owner and of the agricultural industry as a whole. It is quite clear, for example, that the owner of farm land in 1924 had property of less exchange value than was possessed in 1913.

There are indications that the relative disadvantage of the farm land owner will continue for some time. It is to be noted for example that the index numbers of the all commodity prices and of the agricultural prices have attained a certain constancy since 1922. However, if the prices of non-agricultural products and labor continue to fall steadily and the prices of agricultural products continue to rise gradually, the disadvantageous position of farm land owners will tend to improve. Present trends, however, in the economic and political situation indicate that this readjustment will be slow, and will probably not occur for several years, perhaps for more than a decade.

FALLING LAND PRICES ANALYZED

An explanation of falling land prices calls for a close analysis of the elements which give farm land a market value. As is the case with any type of productive property, the anticipation of net income is the most important factor in determining the price. If the income from the products of the land continues to increase at a more rapid rate than the costs of operation, there is a basis for an increase in the price of the land. This is what occurred during the period of the World War and for several years previously, but since 1920 the income has dropped off while the costs of operation have not been reduced proportionately. Figure 5 illustrates this trend for a number of farms in Hancock County, Illinois. It seems safe to conclude that the cause of the distress of agriculture immediately after the war was in large part due to the combination of falling gross incomes and a decided lag in the downward swing of the costs of operations. The opposite combination and a double advantage occurred on the upward swing during the war. Since 1920, falling prices of farm land have reflected this diminished net income and also the diminished faith in future increases in incomes.

A more comprehensive study of Illinois farm land costs and income is shown in Figure 6. This study is based on the "costs" and "income"

per year of 100 acres of average farm land in the state from 1913 to 1923. The costs were computed from the weighted index numbers of the cost of man labor, horse labor, machinery, and seed for the following crops: Corn, oats, wheat, and mixed hay. These farm crops were chosen because they occupied almost all the cultivated land in the state. The weights used were based on actual cost data, supplied by cost accounting studies, which have been conducted in a typical county in the state.[4] The indexes of costs were further weighted by the average percentage of the farm land in the state occupied by these crops for the census years 1910 and 1920.

FIG. 5: AVERAGE ACREAGE INCOME & EXPENSE, OMITTING INTEREST ON INVESTMENT FOR CORN ON FARMS IN HANCOCK COUNTY, ILLINOIS 1913 - 1922

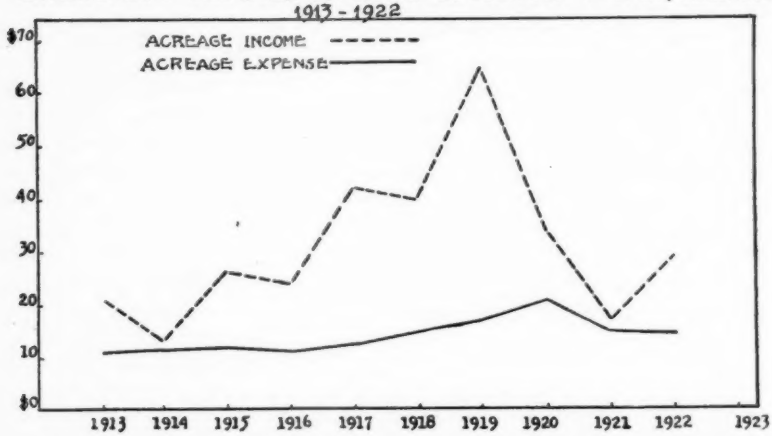
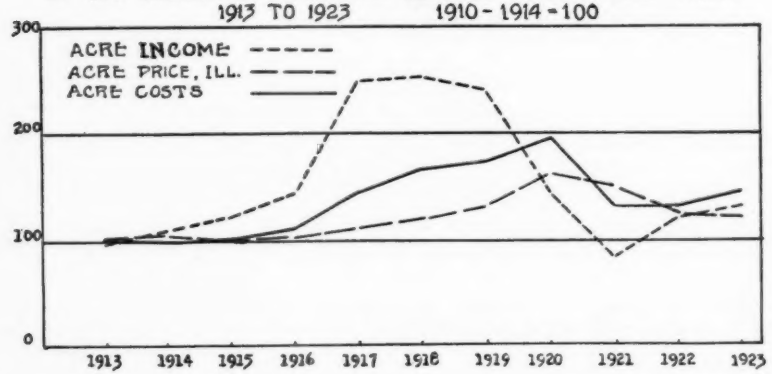


FIG. 6: WEIGHTED INDEX NUMBERS OF THE COSTS AND INCOME OF 100 ACRES OF AVERAGE ILLINOIS FARM LAND FROM 1913 TO 1923 1910 - 1914 - 100



[4] Hancock County studies by the Dept. of Farm Organization and Management of University of Illinois.

FIG. 7. INDEXES OF THE PRICE OF VARIOUS CLASSIFICATIONS OF ILLINOIS FARM LAND AND IMPROVEMENTS FROM 1916 TO 1924 1910-1916 AV. = 100

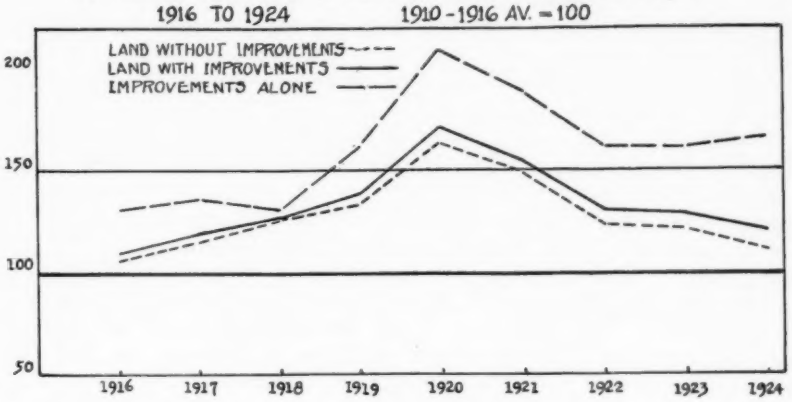
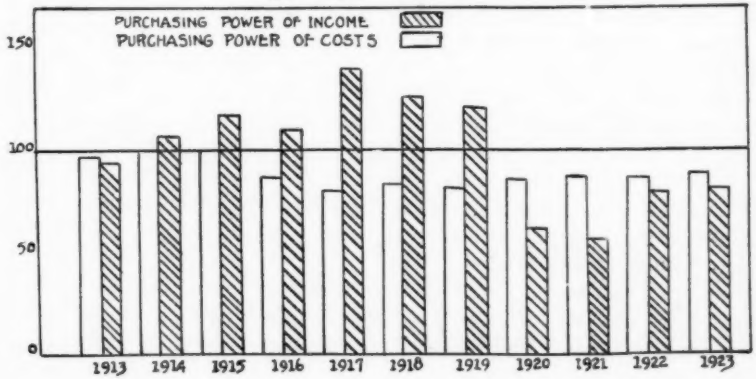


FIG. 8. THE PURCHASING POWER OF THE AVERAGE INCOME AND COSTS OF 100 ACRES OF ILLINOIS FARM LAND 1910 - 1914 = 100



The index of gross returns per 100 acres of land was computed from the average acre yield of the four crops of the state, multiplied by the average farm price for each year. These indexes were weighted in the same manner as the costs in order to give their relative importance for each 100 acres of farm land. The trends of the costs and gross incomes are similar to those shown in Figure 5. It seems certain that the trends of costs and incomes, in a period of rapid price fluctuations, give a better measure of the net margins of profit on which land prices may be based than is given by actual net cash rents.[5]

[5] United States Department of Agriculture Bulletin Number 1224.

Relative to the year 1913, there were great increases in farm profits during the war and until the end of 1919. However, beginning in 1920, the gross incomes became proportionately less than the costs of operation. Gross incomes reached their lowest point in the year 1921. Although the 1913 relationship of costs and incomes was again approached in 1922 and 1923, it was not until the fall of 1924 that the returns once more rose above the costs. The change in the prices of land lagged behind the costs and returns, both on the upward and downward trend. This indicates that farm land purchasers tend to base their estimates on rather recent experiences modified, however, by the immediate prospects for the future. Land purchasers during and immediately after the war evidently did not believe that the favorable net incomes of the war period would continue, nor that the extremely low returns of 1921 would be permanent. That there is a causal connection between net returns and prices of land is demonstrated by Figure 6, although the reaction is somewhat tardy, as has been indicated previously.

With the costs and returns approaching the relationship of 1913 at a price level of 140 per cent in 1923, it seems reasonable to suspect that the price of land (the outlook for the future being comparable) should be about 40 per cent higher than in 1913. This would make the average price of an acre of Illinois farm land about $173 in 1923. Farm land was valued in Illinois in 1923 at an average price of $152 per acre. The difference of $21 per acre cannot, therefore, be attributed to a decrease in current incomes for the year 1923, but must be attributed to a loss of faith in the anticipated increases in land incomes as compared to that faith in the period just preceding 1913. In other words, the "futures" in land prices have fallen since the war. If, however, the costs and return conditions and the all commodity price level pertaining in 1923 should continue, it seems certain that farm lands in Illinois have been somewhat under-valued in 1923.

The rise and fall in the prices of farm land has not affected all classes of farm land equally. Figure 7 illustrates the trend of the price of farm land in Illinois. The price of farm land without improvements and farm land with improvements rose approximately at the same rate from 1913 until 1920. When prices of land began to fall, however, the land without improvements fell more rapidly. This is consistent with the great fall in the profits from the land and the continued high cost of improvements. It will be observed that the value of improvements per acre of Illinois farm land rose higher during the war than the farm land alone, and furthermore that the improvements have, after a slight decline in 1920 and 1921, not only maintained their value but have risen steadily.

Relative to all commodity prices, farm operating costs have never been as high as in 1913.[6] It is true, that in terms of dollars the costs had

[6] Farm costs reflect very largely the low cost of farm products in times of depression. Thus low costs tend to be somewhat pyramided.

continued to rise until 1920. In 1921 the costs dropped suddenly. Since 1921, however, operating costs have continued to rise each year. The rise in all commodity prices has been somewhat greater than that of the costs of operating farm land and has tended to neutralize the rise in the purchasing power of these costs. This tendency is illustrated in Figure 8. In the same figure farm land incomes are shown to have been relatively high from 1914 to 1919, but in 1920 and 1921 the purchasing power of farm crops fell much farther than did the costs. The purchasing power of the income was somewhat recovered in 1922 and 1923, but was yet but 85 per cent of the pre-war figure. These facts, which are brought out clearly by Figure 8, show that to compare farm crop incomes or prices with 1913 prices and incomes "alone," in indicating the relative prosperity of the land owner, is to neglect the advantage which has been enjoyed from relatively lower operating costs.

SUMMARY

The economic readjustments of the war and post-war period have profoundly modified the farm land situation in the United States. Prices of farm land rose rapidly until 1920, but from 1920 to 1924 the price of farm land fell 27 per cent which is about two-thirds of the gain in prices from 1913 to 1920.

Since the all commodity price curve of 1915 to 1920 rose relatively more rapidly than the price of farm land, the purchasing power of farm land has never been as high as it was during the period from 1913 to 1915. Calculated in terms of purchasing power, farm land owners, with the exception of those owning land in the cotton producing areas, had lost in 1924 about 20 per cent of the pre-war exchange value of their properties.

The reasons for the rapid fall in the price of farm land are in large part the combination of falling gross incomes and a decided lag in the downward trend in the costs of operation. The fall in both the incomes and costs since the war have been greater than the fall in all commodity prices. Therefore, to compare farm crop incomes or prices from 1920 to 1924, with the incomes or prices of 1913, in indicating the relative prosperity of the land owner, is to neglect the advantage which has been enjoyed from relatively lower operating costs.

The present trends in the economic and political developments indicate a slow recovery of the pre-war purchasing power of farm land. The conditions in Europe, in the United States, and in the newer agricultural countries point to this conclusion.

Increasing population will tend to force the margin of cultivation to poorer land and will compel a more intensive use of the better land because of a demand for increased production. This will normally raise the net income from the land. This tendency may be neutralized by technical improvements in production which greatly increase the acre yield or by a change in consumption habits to less costly foods. On the other

hand, diseases and pests such as the cotton boll weevil and the European corn borer may decrease the acre yields, making necessary the cultivation of poorer lands. This will tend to decrease the farm land supply relative to the demand for it and will tend to raise the price.

Since the loss in the purchasing power of farm land after the war has been due mainly to a falling off of the effective demand of western Europe for the available staple farm crops, and not from general overproduction[7] of these crops, it can be expected that the state of the world markets for agricultural products will continue to influence land prices in the United States. The United States has been and is an exporting country of agricultural products and will remain so for several decades to come. Prices of farm land will depend in no small degree upon our ability to sell our agricultural surplus upon the world markets.

TABLE I.
INDEXES OF THE PRICE AND PURCHASING POWER OF FARM LAND IN THE UNITED STATES BY DIVISIONS
1913=100

PRICE

Years	U. S.	South Atlantic	E. North Central	W. North Central	E. & W. South Central	Mountain & Pacific	New England	Mid-Atlantic
1912	94	98	94	95	98	87	94	
1913	100	100	100	100	100	100	100	
1914	105	106	103	105	104	111	102	
1915	105	100	104	108	104	109	100	
1916	114	115	111	120	109	110	104	
1917	112	123	115	120	122	105	108	
1918	123	137	126	131	150	114	122	
1919	134	158	134	146	168	169	132	
1920	162	207	161	187	209	205	160	
1921	154	178	147	176	186	202	152	
1922	130	152	128	143	163	141	128	
1923	123	157	125	134	160	122	122	
1924*	118	160	118	126	161	116	117	

PURCHASING POWER

1912	-----	-----	-----	-----	-----	-----	-----	
1913	98	98	98	98	98	98	98	
1914	105	106	103	105	104	111	102	
1915	102	97	101	105	101	106	97	
1916	88	88	85	92	84	85	80	
1917	62	68	64	66	67	58	59	
1918	62	69	64	61	76	57	62	
1919	64	75	64	70	80	80	63	
1920	70	90	70	81	90	89	70	
1921	103	119	98	117	124	135	101	
1922	85	100	84	94	107	93	84	
1923	78	100	79	85	102	78	78	
1924*	78	105	78	82	106	76	77	

[7] Journal of Farm Economics, October, 1924, by Max Sering.
*First six months.

SEASONAL FLUCTUATIONS IN THE PRICE OF COTTON

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Changes in the price of cotton from month to month through the season are of interest to a number of people. Farmers would like to know in the fall which way the price will move so they could decide better whether to sell their crop at picking time, or (if their creditors would let them) to hold it till some later date and secure a higher price. Cotton dealers, buyers, and speculators have an obvious interest in price variations. Now that farmers' cotton marketing associations are doing a large business, the question arises whether they should sell in equal monthly allotments in an attempt to stabilize the market (which they yet can affect but little) or should endeavor to predict seasonal changes and sell a larger proportion of the crop during the month of highest price. Finally, agricultural economists would like to be able to predict price fluctuations, both from a scientific interest in price behavior and from a desire to present data to farmers and their organizations that will aid them in conducting their business on a more sound and profitable basis.

While there no doubt are a large number of factors that influence changes in the price of cotton after picking time and that need to be studied as guides if accurate predictions are to be made, it was thought that the price of cotton itself at picking time might be a guide of considerable importance. This theory was based on the human tendency to believe that what is now will continue to be, that the future may be judged by the present. If the majority of people selling or buying cotton act on this belief, as it is suggested they do, then if the price at picking time was high (compared with the average for that period), it would be expected to remain high and the following events would occur: (1) producers would be rather inclined to hold their crop for a still higher price whereas buyers would be more eager to purchase before a further price rise should occur, thus tending to make a "sellers' market" which in itself would tend for a time to increase the price still further and above what conditions really justified, (2) a high price level since picking time would influence farmers to plant a larger acreage the following spring with the expectation that the new crop would sell as well, (3) as the large acreage developed during the growing season it would depress the market until at picking time there would be a large crop coming on the market at a low price. Applying the theory to such low price years, the opposite condition from that just used for illustration, would simply mean reversing events and consequences all through the season—more rapid selling by farmers, price depressed

too much, smaller acreage planted, and rising prices through spring and summer. For the remaining type of years, when the price at picking time was nearer the average, similar behavior on a smaller scale would be expected, though often obscured or more than offset by such other influences affecting cotton prices as general business conditions, weather, etc. The practical application of such a theory for a farmer would be to sell his crop at once if the price was high, especially if very high, but to hold it if the price was low, holding even for a year in case of very low price.

The cotton price quotations most desirable for use in checking up on this theory seemed to be those of middling cotton at New Orleans, because of the wide publicity prices on this market receive through its importance in spot and future transactions. For months from 1890-1910 the average of high and low prices was furnished by H. G. Hester, of the New Orleans Cotton Exchange, for later months average prices were taken from the 1923 *Yearbook* of the U. S. Department of Agriculture. On account of the violent fluctuations in the general price level during part of the period studied, current cotton prices were divided by the Bureau of Labor Statistics Index Number of Wholesale Prices for the corresponding months using 1910-14 as 100 per cent. It is this sense of purchasing power that is meant by cotton "price" throughout the discussion.

In selecting the month with which to start the season it seemed desirable to have one as early as possible, so that most of the crop would still be in farmers' hands, but yet late enough so that the size of the crop about to be harvested would be fairly well known and its effect on the price established. October was finally chosen for the initial month as best meeting these requirements. Not much more than one-fourth of the season's cotton crop is usually ginned before October 1,[1] and only about 15 per cent of it sold.[2] The correlation between the government forecast of production issued about October 1 and the final estimate of the crop is high, r equaling .685, and is considerably more accurate than their forecasts at earlier dates.[3] To determine whether the October price in any year was high or low, the percentage departure from a 5-year moving average centered was used. Similarly, monthly price fluctuations throughout any given season were measured by expressing the price each month in per cent of the October price for that season.

The average accuracy of the October price as an indicator of subsequent seasonal fluctuations is shown in Table I. Apparently the practical application of the theory suggested holds true on the whole. A farmer who made a consistent practice of selling at picking time if the price then was 15 per cent or more above average, or of holding till the

[1] *Yearbook of the U. S. Department of Agriculture*, 1923, p. 797.
[2] *Op. cit.*, p. 805.
[3] Moore, H. L., *Forecasting the Yield and the Price of Cotton*, p. 74.

TABLE I.—RELATION BETWEEN THE PRICE OF COTTON IN OCTOBER AND IN SUBSEQUENT MONTHS

October price in % of 5-year moving average Group	Average	No. of yrs.	Oct.	Nov.	Price as Percentage of October Price. Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.
115 and over	122	9	100	103	103	103	101	98	99	100	100	98	92	84	78
100-114.9	104	9	100	101	101	102	100	102	101	101	105	105	102	99	102
85-99.9	95	10	100	103	104	105	106	108	106	108	115	113	110	110	110
Under 85	75	6	100	98	95	98	99	99	105	109	111	113	116	129	135
All years	---	34	100	101	102	102	102	102	103	104	107	106	103	101	100

following spring or fall if the price was 15 per cent or more below average, would have received many hundred dollars more during this period than one who sold consistently at any other time. In the years included in the second and third groups he would have gained also, though not so much. Evidently the old saying, "plant when seed is cheap" might well have a companion "store if cotton is cheap, sell if it is high."

When the years in the period studied are considered individually, however, it is plain that some of them are exceptions to the rule, so that a farmer guided by it would fail to secure a high price for every crop though he would almost certainly be ahead financially at the end of a few years. Taking the first group of years, in Table II, when the October price was 115 per cent or more of the average, the quicker cotton was sold the better off the grower was in most cases. Out of the 9 years included, it would have paid to hold cotton until December in four years, January four years, March two years, May three years, July one year, and until later months in no case. Although the price rose a little in some of the other years, it did not rise enough to exceed the usual cost of holding the crop, which is estimated conservatively at .1 cent per pound (50 cents per bale) per month at the 1910-14 price level.[4] Though this holding cost was exceeded slightly in the exceptional instances above enumerated, the profit was so small in most cases as not to justify the chance. The holding cost, naturally, would have to be added to the larger price declines which were so much more numerous, increasing the losses of storing in these years.

Barring the very abnormal year 1920-21, the fourth group of years in Table II (October price under 85 per cent of the average) follows the expected behavior even more than the group just considered. For such low price years, it appears to pay well to hold cotton till the following summer or fall, the price rise by July or October being appreciably higher than holding costs in five

[4] Itemized per bale as follows:

Interest ½% of 500 lbs. @ 10.55 cents	$ .26
Insurance ⅛% of 500 lbs. @ 10.55 cents	.03
Warehousing and extra handling	.21
Total	.50

TABLE II—SEASONAL PRICE FLUCTUATIONS FOR INDIVIDUAL YEARS

Year	Per cent by which October price varies from 5-year moving average	Per cent by which price for specified months varies from preceding October price						
		Dec.	Jan.	Mar.	May	July	Aug.	Oct.
1900-01	26.9	—.7	.3	—10.3	—16.8	—11.5	—10.6	—17.9
1913-14	26.4	—3.6	—3.0	—2.9	1.2	1.1	*	—46.8
1923-24	24.7	21.1	17.8	.4	9.4	4.2	—6.9	—19.0
1895-96	22.7	—6.3	—7.0	—8.1	—8.5	—18.2	—9.0	—9.4
1910-11	20.8	2.4	11.9	8.8	17.1	7.0	—10.5	—28.1
1919-20	19.5	6.6	3.0	3.7	—2.6	—2.4	—12.2	—40.6
1896-97	19.2	—6.1	—7.3	—4.3	.8	4.6	.0	—24.5
1890-91	17.6	—8.1	—6.5	—11.0	—14.5	—17.7	—17.9	—14.4
1909-10	15.4	7.2	8.4	3.0	6.4	7.7	7.9	3.6
1918-19	11.3	—5.6	—6.1	—11.4	—5.9	3.8	—5.8	8.5
1903-04	5.4	29.6	47.6	53.2	35.2	11.6	11.6	1.5
1906-07	3.5	—1.1	—4.3	—1.4	9.2	16.0	18.5	—1.2
1904-05	3.4	—24.3	—30.8	—23.5	—16.8	6.1	5.2	1.5
1916-17	2.6	—2.7	—10.4	—12.3	—13.5	6.7	4.9	15.4
1917-18	2.6	9.2	15.5	19.8	4.2	3.1	3.6	5.8
1893-94	2.0	—.4	2.2	.8	—3.1	—4.4	—7.5	—23.7
1905-06	1.2	12.5	11.0	5.3	8.6	4.2	—5.1	—.3
1891-92	.7	—7.7	—10.9	—16.7	—7.3	—8.5	—8.9	—1.7
1892-93	—.5	18.5	17.4	9.3	—6.0	—.4	—5.3	3.3
1922-23	—.8	14.2	23.2	33.8	19.3	19.0	12.6	33.3
1907-08	—1.8	8.1	11.1	4.0	3.0	5.7	—5.3	—13.7
1915-16	—2.0	—5.9	—8.9	—15.7	—11.5	—10.0	—3.8	7.9
1912-13	—3.0	16.9	14.8	13.7	13.3	12.7	9.7	24.1
1901-02	—4.5	—2.1	—2.0	4.6	14.3	7.0	3.6	—3.1
1899-00	—5.2	2.2	4.4	26.9	27.5	43.5	39.9	36.8
1921-22	—9.0	—8.4	—10.5	—11.9	—2.4	6.3	4.1	7.2
1897-98	—11.3	—10.0	—10.5	—5.3	—.4	—2.5	—6.2	—16.7
1902-03	—12.2	—.4	3.3	16.0	33.5	62.0	59.0	19.7
1911-12	—18.2	—4.6	—4.8	5.2	13.5	25.3	18.1	6.1
1908-09	—18.9	—3.0	—2.3	—.9	10.8	24.8	27.4	39.1
1894-95	—23.6	—6.4	—8.2	—1.4	18.8	19.3	28.4	55.6
1898-99	—25.6	1.3	8.2	10.4	8.5	5.9	8.2	23.6
1920-21	—28.8	—17.9	—13.8	—28.1	—18.3	—18.2	—9.6	34.4
1914-15	—35.6	2.3	11.0	16.5	25.0	20.5	23.6	62.1

*No quotation, exchange closed.

of the six years considered. A short hold, on the other hand, appears worse than none at all, the cost of holding being exceeded by the rise in price by December in no case, by January in two cases, and by March in a third case. This slump in prices through the winter months, and resulting "buyers' market," however, is in line with the behavior anticipated in the first part of the theory set up near the start of this discussion.

For the remaining groups of years (October price 85-99.9 per cent and 100-114.9 per cent of average), specific years differ widely from others of their group. Apparently the October price does not vary sufficiently from normal to bring enough other events in its train and thus to serve as an accurate guide for selling or holding. In certain years the former practice would pay well, in others the latter. On the whole, higher prices would be received by selling at once if the price was slightly above normal, or of holding until June or July if the price was slightly below normal, than by selling consistently at any other time. What is needed, however, is a study of other factors influencing

seasonal price trends, so that such years may be further classified and their price behavior more accurately predicted.

That the rule "store if cotton is cheap, sell if it is high," would pay if followed over a period of years, but not for individual years is further illustrated by correlation coefficients calculated. Correlating the percentage deviation of October price from the 5-year moving average with the percentage deviation of subsequent months from their average relation to October, the following values were obtained: October and May — .303 ± .104, October and July — .383 ± .098, October and the following October — .789 ± .043. In the last case only is the correlation high enough to indicate very closely what the price would be in a given year, though in the other cases the trends are reliable in the majority of instances. The correlation would be much greater each time if only those years were used in which the October price was more than 15 per cent above or below average. The inadequacy of the October price in predicting price tendencies for other years has already been mentioned.

Should December instead of October have been taken as the initial month, there undoubtedly would have been a closer correlation between a high or low price in the initial month and the fluctuations during subsequent months, part of the price variation between October and December being due to more accurate information as to the size of the crop being harvested, and resulting in the December price being more closely adjusted than the October price to the quantity of cotton produced. This last is indicated by a correlation cofficient of — .428 ± .094 between October price and production as compared with one of — .506 ± .086 between December price and production, deviations from secular trend being used in both cases. To offset the gain in accuracy, there would be the lateness in the season, the best selling time being before December for one group of years. Probably it would be desirable to act on the October predictions in these years, but for the remaining years to use as a further check predictions based on the December price.

Some of the assumptions made early in this discussion as a basis for the theory that the October price of cotton might be a guide to the course of prices in later months may now be taken up. The first of these was that the majority of farmers would sell their crop more rapidly than usual if the price was low, fearing it would go still lower, or would put less of their crop on the market if prices were high, hoping they would go still higher, thus tending themselves to push prices out of line with what basic conditions justified, and bringing on the ensuing reaction. To answer this very definitely would require data on farmers' monthly marketings as is ascertained by the Bureau of Agricultural Economics. Unfortunately, this is not available previous to 1912. Since later years have been so abnormal, no correlation coefficients were calculated. Some basis for an affirmative answer, however, is given by the average price fluctuations for the different groups of years in

Table I. Normally, the price does rise from October to December or January if the October price itself is high, and fall if it is low, indicating that farmers' action regarding marketing might tend toward the temporary sellers' market in the first case, and buyers' market in the second case. But it is recognized that other causes, too, might account for this.

The next assumption made, that the level of cotton prices from picking to planting time has an effect on the acreage planted, seems clear. Correlating the average price for December, January, February, and March with the acreage harvested the following fall for the 34 years studied, r equals .632 ± .069 (using deviations from secular trend). Considering a shorter period of years, the months November to February, and first differences, Smith secured coefficients as high as .98 and .99.[5]

It was further suggested that the number of acres planted to cotton would act as an *immediate* cause of price tendencies during the balance of the season, the price level up to planting time being the *primary* cause since it largely determines acreage. As had already been indicated, October price and bales produced are inversely related. Therefore, if production depended only on acreage the importance of the latter as affecting prices would be clear. For a few weeks after planting time, acreage is about the only indicator of the size of the new crop, so its influence on prices may be comparatively large. But as the season develops, condition reports give an idea of the yield per acre, on which production depends as well as on acreage, especially since the boll weevil became so serious. The result is a correlation between acreage and October price of only — .159 ± .112 for the entire period 1890-1923, although for 1890-1913 it was larger, being — .368 ± .118. While acreage, then, may be important for a time as the medium of the October price level in influencing price trends from planting time till the new harvest, it gives way to other factors, probably yield first and general economic conditions second, as the growing season develops. This is especially true in the last ten years when yields have been more uncertain with increased boll weevil ravages, and war and post-war disturbances great. But nevertheless, there is a high correlation between the price in October and in the following fall, as has been shown.

In conclusion, the price of cotton in October appears to give some indication of the price trend in future months. If the price is more than 15 per cent above the average, it will likely remain near that level during the winter and spring, then fall considerably during the following summer and fall, while if it is more than 15 per cent below average, it will likely slump a little through the winter and then rise considerably during the spring, summer, and fall. The remaining years, when the October price is within these limits, vary so much between themselves that averages of their individual trends have little meaning, knowledge of the effect of other factors being needed so that these years may be sub-grouped if possible.

[5] Smith, Bradford B., *Forecasting the Acreage of Cotton*, Journal of the American Statistical Association, March, 1925.

BOOK REVIEWS AND NOTICES

Making the Tariff in the United States, by Thomas Walker Page, New York. McGraw Hill & Company, 1924. Pp. x +281. $2.50.

Many honest-minded economists, as well as Republican statesmen, have been wondering during the past four years why we have a Tariff Commission. The Honorable Thomas Walker Page, chairman of the Tariff Commission during the latter years of the last Democratic regime, and just following, thinks, strangely enough, that we should have such a commission; and in this readable little hand-size volume of the Institute of Economics Series, undertakes to find something for it to do that will justify its existence. He admits that "The Tariff Commission had little *influence in determining* the duties in the present law." (p. 29.) He furthermore makes it very emphatic in Chapter IV that the labors of the Tariff Commission in the past four years, in trying to adjust the tariff rates on the basis of difference between cost of production at home and abroad, have been entirely futile. But he is not contemplating that "the law enforcing this unfortunate diversion of the Tariff Commission's labors will be long maintained." (p. 205.) And in Chapters VII and VIII he outlines what he considers to be a workable program for a tariff commission and even submits a draft of a bill to reestablish the Tariff Commission on this basis.

This program is the objective of the whole volume. The earlier chapters are devoted principally to laying a foundation for it and leading up to it—the chapters on how the tariff has been made in the past and is now being made (Chapters I to IV), and also the chapters on the information needed for tariff-making (Chapters V and VI). And when this program is finally sprung upon the reader in its full magnificence in the last chapters, it proves to be, as Dr. Nourse points out in a dissenting argument in the appendix, simply the old program tricked out in a garbled version of the old cost-difference fallacy. To be sure, Mr. Page is asking that the Tariff Commis-

sion go farther than it has gone in the past and actually nominate rates for Congress to consider, not with the idea that Congress will accept them as nominated, but rather that it shall use them as points of departure. But the rates so nominated are to be such as "would enable domestic producers of similar articles operating under normal conditions and with reasonable efficiency to compete on equal terms in the markets of the United States with foreign producers of said articles of foreign origin." (p. 216.) This, it should be apparent, is merely another way of saying "equalize the difference in the cost of production at home and abroad."

The question that sticks out like a sore thumb as one lays down the book is how Mr. Page happens to fail to see that these two propositions are identical. This particular reader, having on hand the job of reviewing the book, took the trouble to go back over it and find an answer to the question. And presently the answer came. The truth of the matter is, Mr. Page does not really understand that the cost-difference formula is *fallacious*. His arguments against it are solely on the basis of its *unworkableness*. If he really understood the fallacy in it, he would see that the same fallacy inheres in the competitive-equality formula. And the reason he fails to see the fallacy in the cost-difference fallacy, is that he has an inadequate, perhaps even a faulty, theory of costs and cost differences. How else could he have made such statements as the following: "In many industries as now conducted, costs of production are higher in America than they are abroad." (p. 83.) "Very often costs vary because of unequal climatic conditions, qualities of soil, advantages of location, or availability of fuel or water power." (p. 91.) If Mr. Page understood that all true differences in costs of production between countries, except those due to imposed and effective tariffs, and to transportation costs, are due to maladjustments of various kinds in the two countries—such maladjustments as lags in wages, rents, and other costs behind changing prices, freight rates, and the like; lags in re-combinations of enterprises to meet changing economic conditions; short-time variations in output, due to business cycle influences and the like;

temporary circumstances, such as weather and labor difficulties—could he have written two such statements as these?

And yet the author comes close in spots to showing that he does understand the underlying economic principles. For example, in Chapter VIII (pp. 222-225), he does a good job of showing that competitive equality must take account of the "marginal producers" in the competing countries, and that there will always be these marginal producers no matter how high the duty, and that the only effect of changing the tariff rates is to give us a different group of competing marginal producers. Why then, does he not see the folly of talking about determining tariff rates that will "equalize competition" between them? According to his own statement, they *are* competing on equal terms. By putting on tariff enough, we would have all our tea produced at home. Once our tea industry was well established and operating on a "normal" basis, we would have equality of competition between our marginal tea producers and those in other countries. The only kind of a tariff that does not under *normal* conditions exactly equalize competition is one that does not give us an adequate domestic supply no matter how high it is—because of monopoly control, limited natural resources, and the like.

Mr. Page attempts to strengthen his position by showing that competitive equality is coming to be the commonly accepted tariff philosophy, that even the Republicans and the Democrats agree in accepting it. The Republicans naturally accept it—*it is in essence the protective doctrine.* If any Democrats accept it, it is because they are really protectionists. The reason that many Democrats vote against high protective tariffs is not that they are really opposed to them on principle, but that they have nothing that can be "protected." Let it be said, however, that there is still a group of southern Congressmen who, like nearly all public men in Great Britain, really understand the economic principle of comparative advantage; and none of these espouse the competitive-equality fallacy any more than they do the cost-difference fallacy.

Perhaps one should excuse the author for such transgressions on the score of his statement in his opening paragraph that it is not his purpose to discuss a suitable tariff policy for

the United States, but instead the proper way of enacting tariff laws. It seems very plain to the reviewer that a clear understanding of tariff principles is as necessary for one purpose as for the other.

Dr. Nourse is of the opinion that the Tariff Commission should content itself with merely studying the effects of tariffs upon prices, production, consumption and the like. Mr. Page thinks that the commission's findings must be reduced to more specific terms if Congress is going to heed them. The reviewer is inclined to agree with Mr. Page in this particular. But he would suggest that the findings take the form of advance estimates of the effect on prices, production, consumption and the like, of a series of different rates such as Congress is likely to consider. Thus the commission might estimate that a 30-cent duty on flax would increase our crop to 30,000,000 bushels eventually, and a 40-cent tariff to 35,000,000 bushels, etc. Such estimates would, of course, be difficult to make; but if investigations were really centered upon this objective, results could be obtained that would be more dependable than any based upon the cost data now being obtained.

Except for this, the reviewer agrees with every word in Dr. Nourse's Appendix B. Why cannot we have done, asks Dr. Nourse, with this nonsense about "equitable" or "correct" tariff duties? There are really only two major questions involved in tariff making. One of these is the particular rate that will yield the highest revenue. This is really a matter for scientific determination—as near as most matters can be determined in the world of economics. The other question is whether or not as a nation we want to produce more of this particular product in place of more of some other product. There is no equity in it—at the outset; but once a group of producers has built up an industry on the basis of a tariff subsidy, then the whole question of the equity of vested interests is involved. There is nothing in this question, as such, for scientific determination—at least on such bases as are accepted at present. But once our statesmen have decided whether or not they wish to expand a given line of production, and how much, then the matter of how much of a duty will

accomplish this expansion, and how soon, is a matter for scientific determination—not an easy determination, to be sure, but nevertheless one lending itself to a scientific attack. Here, then, are two problems which a properly trained body of tariff specialists could attack in a scientific spirit. The data needed are very roughly those outlined in Chapters V and VI of this volume. Cost of production data are not what is wanted.

It will not do to conclude this review without expressing gratitude to Mr. Page for a number of things. First of these is his description of how the tariff has been made in the past and is now being made. This is all very illuminating. Second is the strong case he makes out against the flexible tariff provision, and against trying to base the tariff on cost-differences. Third is the considerable amount of information as to how tariffs actually work. Fourth is his first-hand information as to how the Tariff Commission works. All of these things are so important and so timely that the book is surely a godsend in spite of its confusion of doctrine. The flexible idea in tariff-making is a good one; but surely we must have another basis than the present for determining what tariff to impose. President Coolidge's recent amusing remarks on the subject of the sugar tariff show that even he has in effect discarded the cost of production procedure, although perhaps he does not realize it. A new shake-up in tariff-making is much needed, and Mr. Page's book should help in the right direction.

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ANNUAL MEETING OF FARM ECONOMIC ASSOCIATION
NEW YORK CITY, DECEMBER 28, 29 30

Central Theme—Research in Agricultural Economics

MONDAY, DECEMBER 28

Forenoon: Theme—The Challenge to the Agricultural Economists.

What Congress expects from the Purnell Bill.

Need for Specific Objectives in Economic Research—Dr. E. W. Allen, Chief, Office of Experiment Station, Department of Agriculture, Washington, D. C.

Economic Research Now Being Conducted Under the Purnell Bill—Dr. J. I. Falconer, Department of Rural Economics, Ohio State University.

Afternoon: Theme—National Agricultural Policy. Joint Session with the American Economic Association.

Evening:

Presidential Address—The Source Material of Economic Research and Points of View in its Organization—M. L. Wilson, Department of Agriculture, Washington, D. C.

The Relationship Between Economic and Biological Research in the Experiment Station—Dr. J. G. Lipman, New Jersey Experiment Station.

The Concept of an Evolving Social Order and its Significance in Agricultural Research—Walton Hamilton, Institute of Economics, Washington, D. C.

TUESDAY, DECEMBER 29

Theme—Research in Farm Management and Marketing

Forenoon: Theme—Research Methods in Farm Management.

Farm Business Analysis—Dr. W. I. Myers, Farm Management Department, Cornell University.

Detailed Cost Studies—

Studies of the Effectiveness of Individual Enterprise—Mordecai Ezekiel, Department of Agriculture, Washington, D. C.

Individual Farm Reorganization—Prof. C. L. Holmes, Iowa State College.

Studies of Maladjustment in Specific Areas—Dr. W. J. Spillman, Department of Agriculture, Washington, D. C.

Afternoon: Theme—Research Methods in Marketing.

What Cooperatives Desire from Research Workers in Farm Management and Marketing—Dr. Frank App, Federated Fruit Growers Association.

Studies of Market Supply, Price and Sales as a Basis for Control of Distribution of Perishables—Walter P. Hedden, Port of New York Authority.

Research as an Aid to Establishing the Factors which Determine Market Price—Holbrook Working, Food Research Institute, Stanford University, California.

Discussion—Led by E. G. Nourse and H. A. Wallace.

Evening:

The Extent to which Production can be Adjusted to Prospective Demand—B. B. Smith, Department of Agriculture, Washington, D. C.

How Much Adjustment is Needed on Individual Farms?

The Struggles of the American Farmer against Industrialism—Dr. C. R. Fay, University of Toronto.

WEDNESDAY, DECEMBER 30

Forenoon: Theme—Using the Product of Agricultural Economic Research.

Agricultural Economics Research and State Extension Programs—W. A. Lloyd, Extension Service, Department of Agriculture.